UNITED
NATIONS

E

Economic and Social Council

Distr.
GENERAL

E/C.7/1993/2
18 February 1993

ORIGINAL: ENGLISH

COMMITTEE ON NATURAL RESOURCES
First session
29 March-8 April 1993
Item 3 of the provisional agenda*

PERMANENT SOVEREIGNTY OVER MINERALS AND WATER RESOURCES

Report of the Secretary-General

SUMMARY

The present report has been submitted in response to the request of the Economic and Social Council put forth in its resolution 1991/88, paragraph 5. This report continues the regular reporting on developments related to the exercise of permanent sovereignty over natural resources. In particular, it reviews developments and trends with respect to the exercising of permanent sovereignty in the context of sustainable development, discusses salient issues affecting water resources and describes the focus of technical cooperation activities of the Department of Economic and Social Development of the United Nations Secretariat in support of Governments in the exercise of permanent sovereignty over natural resources.

* E/C.7/1993/1.

93-09471 (E) 090393 150393

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INTRODUCTION

1. Since the adoption by the General Assembly of the relevant resolutions 523 (VI) of 12 January 1952, 1803 (XVII) of 14 December 1962 and 3201 (S-VI) and 3202 (S-VI) of 1 May 1974, the Economic and Social Council and the Committee on Natural Resources have been monitoring developments in the area of the exercise of permanent sovereignty over natural resources. The present report is submitted in accordance with the request of the Council in its resolution 1991/88, paragraph 5.

2. The main objective of the report of the Secretary-General on the present topic has always been to survey current trends related to the implementation of the principle of permanent sovereignty over natural resources, in particular concerning the relationship between mineral-producing developing countries and the international economic system. Many, if not most, countries consider that principle a part of international law, and link it closely with their capability to use their natural resources more efficiently and in conformity with national development policies. The report of the Secretary-General has usually focused on two major elements in the discussion of permanent sovereignty. The first concerns the sovereign right of States to choose natural resource development policies that they consider most suitable, and the second focuses on the objective of removing impediments to the full and free implementation of the principle of permanent sovereignty over natural resources by States.

3. The present report, like a number of prior reports, focuses on the first element by surveying the trends in State practice in activities relating to mineral and water policies and planning especially within the context of how Governments respond to other evolving principles affecting the international community.

4. With regard to such government responses, in view of the increased global awareness of environmental issues and, in particular, in the light of General Assembly resolutions 44/228 on the United Nations Conference on Environment and Development and 44/229 on international cooperation in the field of the environment, this report addresses issues (and highlights a number of them) that are of particular importance in the context of sustainable development and the exercise by Governments of their inalienable right of permanent sovereignty over mineral resources.

5. The report also highlights recent developments concerning the draft articles on the law of the non-navigational uses of international watercourses. It then discusses the legal and institutional issues relevant to the exercise of permanent sovereignty with respect to water.

6. This report deals with the removal of impediments to the full and free implementation of permanent sovereignty by focusing on the international technical cooperation activities of the Department of Economic and Social Development of the United Nations Secretariat.

I. PERMANENT SOVEREIGNTY OVER MINERAL RESOURCES IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

A. Complementarity of principles of international law

7. As enunciated in the Declaration on the Progressive Development of Principles of Public International Law Relating to a New International Economic Order, 1/ adopted by the 62nd Conference of the International Law Association, held in Seoul from 24 to 30 August 1986, permanent sovereignty over natural resources, economic activities and wealth is a principle of international law that emanates from the principle of self-determination, and is inalienable. The principle implies that a State has national jurisdiction over its natural wealth and resources and (according to General Assembly resolution 626 (VII)) the right freely to use and exploit them. However, it does not preclude a State from accepting obligations with regard to the exercise of such sovereignty, by treaty or by contract, freely entered into.

8. Permanent sovereignty has been invoked by States mostly within the context of relations between host States and foreign companies engaged in the exploitation of the natural resources of the host States. The governing principle in this regard is that States have a right to regulate, exercise authority, legislate and impose taxes in respect of natural resources enjoyed in their territories by foreign interests, subject only to any applicable requirements of international law. Thus, in invoking the principle of permanent sovereignty, States have also had to take into account limitations imposed by the necessary complementarity of other principles of international law.

9. A subject that has recently received close attention in this context of complementarity is that of the principle of permanent sovereignty over natural resources in its interaction and complementarity with evolving principles of international cooperation for sustainable development.

B. Evolving principles of international cooperation for sustainable development

10. In its resolution 44/228, the General Assembly reaffirmed that, in accordance with the Charter of the United Nations and the applicable principles of international law, States had the sovereign right to exploit their own resources pursuant to their environmental policies, and also reaffirmed their responsibility to ensure that activities within their jurisdiction or control did not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction and to play their due role in preserving and protecting the global and regional environment in accordance with their capacities and specific responsibilities.

11. In the same resolution, the General Assembly decided that the United Nations Conference on Environment and Development (subsequently held in June 1992) should have among its objectives to promote the further development of international environment law and to examine the feasibility of elaborating general rights and obligations of States, as appropriate, in the field of the

environment, and taking into account relevant existing international legal instruments.

12. In this regard, the United Nations Conference on Environment and Development did deliberate on the subject of the principle of permanent sovereignty within the context of sustainable development, and it then proclaimed that States had, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control did not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. 2/

C. Historical background of government policy and practices

13. This report reviews recent trends in the exercise of permanent sovereignty in relation to environmental protection and sustainable development. Such a review would best be put in its proper context by first highlighting, in general terms, the historical background of government policy and practices concerning the mining sector of most host Governments, especially host developing country Governments.

14. Until the 1970s, mining companies generally operated on the basis of concessions under which the host government had an essentially passive role as a royalty collector, or later, as a tax-cum-royalty collector. The concessionaire not only enjoyed ownership of the mineral produced, but also exercised practically unfettered management prerogatives of making all critical decisions (including those concerning the protection of the environment). Even the few supervisory or regulatory powers formally vested in the host State were often of only symbolic significance, since it lacked the administrative capability and the technological capacity to enforce them. A combination of circumstances in the 1970s began to trigger change.

15. Projections of rapid depletion of non-renewable mineral resources and the growing demand for minerals in the wake of the high economic growth rates of the 1960s improved the relative bargaining power of mineral-exporting countries. These circumstances enabled host States to introduce new legal and fiscal frameworks to reshape their relations with foreign investors in the minerals sector. Among the objectives that the new frameworks aimed to secure were not only high revenues (government take), but also participation in the making of critical decisions, and acquisition of technology and managerial skills with a view to the exercising of more effective supervision of operations.

16. The 1980s, however, were marked by a progressive reduction in the bargaining power of mineral-exporting countries, particulary developing countries. Global recession reduced demand, as did successful conservation measures. Nevertheless, the new legal frameworks developed in the 1970s were maintained and, in a number of cases, acquired a level of maturity; but the mineral-exporting countries, faced with adverse external economic circumstances, have had to make their fiscal framework more attractive for

foreign investors, and to improve competitiveness in order to attract more foreign direct investment.

17. The development of the new legal frameworks that provided a more decisive role for government in exercising effective supervision of mineral operations also brought to the forefront an emphasis on environmental concerns that was previously lacking. Until then an assessment by most developing countries of the impact on the natural environment had taken a secondary if not marginal role in project planning of activities connected with mining operations.

18. Ironically, the efforts of some outside groups to raise standards in this area exacerbated the problem somewhat. The preoccupation of certain developed nations in the later 1960s and the early 1970s with environmental issues was greeted with considerable scepticism at that time by the leaders of many developing nations, and some of them even suspected that environmental protection constituted a plot to keep their countries underdeveloped. Growing fears emerged in countries of the developing world that developed country environmental concern could affect them adversely in the fields of trade, growth and the transfer of technology.

19. In contrast, today's strong awareness in both developed and developing countries regarding ecology and environmental protection, the demands of conservation and pollution reduction, and the costs involved, and the development of new, clean technologies, provide an entirely new global environment in which strategies of host Governments in the minerals sector are to be shaped. Those strategies need to be carefully assessed and their implications understood if the new trends in investment in the minerals sector are to be identified. However, there is also a need to study the implications of the weakened bargaining position of host countries noted above and in particular the possibility that the difficulties of attracting foreign investment in an increasingly competitive climate might induce some countries to initiate or approve substandard environmental projects, notwithstanding the new awareness of the costs involved.

D. Overview of current practices for environmental impact assessment in mining projects

20. Many developing countries do not have legislation specifically addressing environmental protection. However, most of those countries do utilize provisions in mining law for the purpose of setting environmental standards applicable to the mining sector. Although such provisions do not prescribe precise standards of environmental quality to be attained, they do set the basic criteria that must be translated into environmental protection measures during the actual negotiation and formulation of mining project proposals. This approach has certain advantages. For developing countries that have not yet formulated a comprehensive policy on environmental issues, using contracts to stipulate specific environmental provisions offers an opportunity to set environmental standards that are adapted to the technical and ecological particularities of each mining project without introducing the need for involvement in cumbersome legislative procedures.

21. However, ad hoc negotiation of precise environmental standards in specific contracts can also be disadvantageous to the host country. The translation of general legislative provisions into practical decisions in the course of contract negotiation may require a degree of bargaining over issues that otherwise should not be debatable. In any event it seems advisable, on balance, to encourage the enactment of a comprehensive environmental law prohibiting environmental harm and creating liability for wrongs perpetrated against the environmental wrongs.

22. The way in which negotiations of most mining agreements are carried out involves a special dimension that affects the content of environmental provisions included in the contract. It is important from the point of view of both parties that the content and scope of the provisions dealing with environment be tailored to the needs of the individual mine under consideration; however, because in most cases the negotiations are carried out prior to exploration, such adaptation to the individual case must remain incomplete (since much of the required data are not yet available at this stage). Thus, while a baseline study taking into consideration all parameters will have been carried out, the most that the agreement may further provide at this stage is the requirement that the investor, upon making a discovery, supplement the mining development plan with a comprehensive environmental assessment and management study.

23. For the host country, such open contractual stipulations have the advantage of postponing the specification of environmental requirements until a clear, accurate assessment of information need can be made. For the investor, however, such regulation may pose the disadvantage of setting no definite limits to the costs of development. In addition, the investor will be concerned that the investor and host country, taking into account the results of the environmental impact study, may fail to reach an agreement on whether the investor's development proposals are environmentally sound or not.

24. The investor is acutely aware that at the point where an economically viable deposit is identified, the interests of the Government and the investor may diverge. The investor as holder of a prospecting licence will have already spent large sums on an exploration programme and may have also spent, or contemplate further spending, very substantial sums on feasibility studies. Against this background the investor requires an assurance that if feasibility studies show a positive out-turn, he or she will have the right to mine under a secure long-term title. In principle, most Governments would see that requirement as perfectly reasonable, but very few would draw the conclusion that their legislation should give the holder of a prospecting licence an unqualified right to mine under a long-term lease or licence. Most Governments believe that the public interest requires that a grant of mining rights on a long-term basis should not be awarded unless there are appropriate understandings about the way the mining operations are going to be carried on.

25. Governments have shown a realistic appreciation of what is after all not an unreasonable attitude on the part of investors and attempted to encompass a solution to the dilemma inherent in trying to satisfy both parties through the incorporation of a set of interlocking provisions within their mining legislation. In many countries, the mining legislation provides that the holder of an exploration licence who has established the existence of an

economically viable deposit has, in principle, a statutory right to the grant of a mining lease. However, such laws provide that the applicant for a mining lease must submit in his or her application a proposed programme of mining operations and a number of countries require that the minister concerned grant mining rights only if that programme takes proper account of environmental and safety factors.

26. Some Governments take the view that in the event that the grant of a mining lease (or licence) is refused to a person who has already invested considerable sums of money and the law is treated as giving rise, in these circumstances to a justiciable issue, it may be unlikely that the kind of highly general wording used in mining laws to describe the environmental protection requirements of a proposed programme of mining operations will provide a satisfactory basis for decision by judge or arbitrator about the development plan.

27. Such Governments therefore insist that agreements expressly draw environmental criteria into the approval process for the project and expressly reserve for the Government the right to withhold its approval of plans and designs that may unreasonably damage the surrounding environment, limit its further development potential or significantly disrupt socio-political stability in the area. Agreements may also provide for standards and implementing measures and actions to be reviewed as knowledge of the environmental circumstances related to specific projects or developments changes or improves.

28. It would be futile to make the effort to set environmental standards without making provision for adequate monitoring and enforcement procedures. Various forms of monitoring and enforcement provisions relating to the environment are therefore now becoming a standard feature of some mining agreements. Such provisions consist mainly of environmental reporting requirements and government inspection rights. In addition the mining legislation in certain cases empowers government authorities to carry out necessary remedial and protection measures at the expense of investors, more particularly at the end of the mining operation.

29. Given the cycle related to bargaining strength and the variations in environmental standards discussed above, it is clear that mining companies operate in a world of heterogeneous environmental problems and policies: sovereign nations have been going about the business of environmental protection at different speeds, with different degrees of rigour and using different techniques. Variations in environmental policy follow, in part, from intercountry differences in level of industrialization and standard of living. Other policy variations exist mainly because of differences in political and social philosophy. Sometimes very different approaches to essentially similar problems reflect different traditions in relations of business and government in philosophies of collective intervention, and in patterns of industry competition.

30. In such a radically changing global environment, encompassing so many different country approaches at any given time, studies of trends in investment in the mineral sector cannot consist in extrapolations based only on past patterns and trends. Research must also focus on the new and unprecedented

dimensions that are creating a wholly new context in which innovative forms of partnership and ventures based on new forms of collaboration need to be conceptualised and designed.

31. The Committee on Natural Resources may wish to consider the modalities by which the United Nations can best develop practical guidelines, reference cases and models for environmental impact assessment of mining projects. A detailed study of current practices for environmental impact assessment in mining projects could also be undertaken. In addition the Committee may wish to consider whether a study should be undertaken of the relative effectiveness of the various methods employed by different countries in monitoring the environmental impact of mining projects.

II. WATER AND THE EXERCISE OF PERMANENT SOVEREIGNTY

A. Cooperation in the management of international watercourses

32. Previous reports submitted to the Committee have discussed special issues of water development and use and permanent sovereignty. The main argument advanced in most of those reports has been that national sovereignty has usually to be balanced against international obligations and the integrated development of international watercourse systems. The reports have highlighted numerous instances of international cooperation, particularly concerning river basin development, joint projects for power generation from rivers shared by several riparian countries, and international waterways. Given the growth in the consumption of water, which to some extent parallels economic growth and the limitations on water resources in many countries, important questions continue to arise concerning cooperation in the development and utilization of water, and joint management of international watercourses.

33. The Committee will recall that in 1970 the General Assembly recommended that the International Law Commission (ILC) take up the study of the law of the non-navigational uses of international watercourses, with a view to its progressive development and codification. At its forty-third session, the Commission adopted provisionally the draft articles on the law of the non-navigational uses of international watercourses, 3/ and decided that the draft should be transmitted, through the Secretary-General, to Governments for their comments and observations and that it should be requested that such comments and observations be transmitted to the Secretary-General by 1 January 1993. 4/

34. The Committee may wish to request that a full report on the comments of member States, and other developments on the law of the non-navigational uses of international watercourses, be prepared for its next session.

B. Legal and institutional framework for national water development

35. The exercise of permanent sovereignty over water resources does not raise complex issues in the context only of international cooperation. A sound national water resources policy must form the foundation of any meaningful

efforts at international cooperation. This report therefore focuses on a number of legal and institutional issues relevant to the formulation and implementation of such a water resources policy.

36. Because water is a flow resource, a scarce one, and one with a high potential to engender both positive and negative externalities, the proper regulation and public control of water resources and related activities are essential for a successful water conservation and development system. Nevertheless, it is important to emphasize that the role of legislative and institutional arrangements governing water resources is not limited to merely regulating (in other words, controlling) certain activities or sets of activities. Legislative and institutional arrangements also determine the framework within which the private sector is prompted to invest in water resources development and conservation and therefore perform a structural function of socio-economic engineering, since they determine the manner in which economic agents relate to productive resources. This function of the law has tremendous relevance to conservation and developmental goals, for consequent on its operation those agents are induced to perform certain types of activities, if economically beneficial, of their own free will and on a continuous basis. The critical issue is the ability to strike the right balance between the structural and the regulatory components of a system.

C. Main regulatory elements

37. Generally speaking, the regulatory elements of a legislative and institutional framework governing a sustainable system for water development aim at the protection of the resource base, the assurance of an acceptable level of efficiency in the use of water, and the prevention of non-authorized uses.

38. For such purposes the elements generally covered include:

(a) Public ownership or control of water resources and issuing of permits to allow the use of waters, or to effect discharges into them;

(b) Allocation of water rights, subject to conditions of effective and beneficial use, including in some cases rules on reuse;

(c) Definition of what is to be considered beneficial use, including, in some legislation, consideration of environmental concerns;

(d) Public priorities and preferences in the use of water, and the allocation of water rights, according to the economic, social and physical characteristics of the country;

(e) Public control of water quality and of activities having a bearing on its deterioration, including the use of strict liability clauses for environmental damages, discharge- and water-quality standards, control of the use of products affecting water quality, technological requirements and land-use regulations;

(f) Public control of water use, to ensure that water is used according to publicly allocated, or publicly acknowledged, water rights. Such control requires the implementation of monitoring measures, including rights of entry, power to require information and records and to take samples, approval of significant waterworks, and power to require special practices in the manner in which water is used, to suspend water uses in case of wrong uses or practices, and to revoke water uses in case of serious infractions or non-use;

(g) Protection of water sources, and water-supplies, including basin protection and management, control of deforestation, protection of groundwater sources and recharge areas, integrated water resources planning, and conjunctive use of surface water and groundwater;

(h) Public rights over private property, including rights of way, or other encumbrances, and restrictions or limitations on private property, in order to ensure sustainable development of water resources;

(i) Public right to reallocate and ration available water-supplies during times of drought, or other emergencies;

(j) Determination and collection of financial charges;

(k) Expeditious procedures for the adjudication of conflicts and for the application and enforcement of penalties for non-authorized water uses or pollution of water resources;

(l) Rules to deal with accidents and disasters, including contingency planning, prevention measures and remedial and mitigation actions.

D. Main structural elements

39. In contrast with the regulatory elements of a legislative and institutional framework governing a sustainable system for water development, the structural ones primarily relate to (a) stability of allocated water and land rights, (b) acknowledgement of existing and customary water uses and rights and (c) transferability of water rights.

40. A system that provides certain and stable water rights tends to increase productivity, since the water user will be aware that investments in water development and conservation imply capitalization of efforts. Such a system also results in an increase in conservation and improvement activities, since efforts in this direction will be protecting a future source of revenue. A legal system that, in addition to providing stability, acknowledges and recognizes traditional practices and customary uses of water, or at least compensates fairly for their elimination, enhances trust in government activities and gathers social support in the implementation of water resources programmes. At the same time it does not abruptly disrupt the pattern of ongoing socio-economic activities. Transferability of water and land rights allows users effectively involved in developmental efforts to increase their output. Subject to the overall government policies on land and water rights tenure and provided that no third party or public interest is affected, transferability of water rights is allowed in a number of countries.

41. Clearly, the structural elements of a legal system reflect issues of ownership. In some countries those issues are difficult to deal with if notions of common, tribal or clan ownership impinge upon, or replace, those of individual ownership. The attempted solution to the complications posed by common entitlements has been to give them a stability and a certainty of the kind conferred upon individual rights. However, experience has shown that in a number of the countries concerned, managers or representatives of the relevant group took advantage of their position to acquire benefits at the expense of the group. In such cases, therefore, the Government could put in place controls on the activities of the representatives or the authorities of such groups to ensure at the least: (a) equity in the distribution of the output of common entitlements and activities; (b) limitations in the powers of the authorities or representatives of the group to dispose of the common entitlements on land and waters, as well as of the resources, products, and produce ancillary or appurtenant to the common entitlement (forests, crops and so on); and (c) accountability of the managers and representatives.

E. Issues affecting market and pricing systems

42. A country formulating a water resources development policy must take into account elements that, although not intrinsically related to water resources development, influence what (if anything) will be produced by using and developing water resources, how the benefits of water development will be allocated and distributed, and for how long a particular pattern of production will be sustainable. These issues include accessibility to markets; price regulations; effective demand; organization of credit, marketing and extension services; and inappropriate incentives to production.

43. Like all economic activities, water development is intended to provide goods that should be effectively available on demand, legally marketable, and profitable to produce. Restrictions on marketing and profitability hinder the effort to implement sustainable water development systems. In this regard, some of the most obvious shortcomings to be avoided include:

(a) Restrictions on access to markets;

(b) Limitations on profitability (maximum prices, compulsory buying and so on);

(c) Ineffective systems of credit and extension services;

(d) Subsidies to the use of surface water or groundwater.

F. Functional organization and administration

44. The functional organization for policy-making, water allocation, water management, and monitoring of users plays an important role in the implementation of a sustainable water development system. Where these functions are vested in institutions with functional responsibilities for specific water uses, or for discrete economic activities, water planning and management might not be objective. In these cases each concerned party may

tend to support projects or allocations of waters according to vested functional interests, without regard to the source of supply or the soundness of investments and projects. To avoid such problems, many jurisdictions allocate responsibility for policy-making, water allocation, and programme and project evaluation to a non-user agency or ministry. There is also a trend of transferring responsibility for water-related services to provincial and local levels of government. The main point to note in this regard is that transfers might not be successful if they are not paralleled by availability of economic and financial resources at provincial and local levels.

45. The soundness of investments in water-related projects, programmes and uses is significantly enhanced if they are made subject to compulsory assessment of economic, social and environmental feasibility, as well as to sustainability analysis. The performance of such assessments or analyses is enhanced and their output more balanced when entrusted to organizations responsible for water planning and management but not involved in the promotion of specific water uses. Public participation in policy-making, planning and management is also a characteristic of successful water management systems. In many countries public participation in assessment and evaluation procedures is a common practice.

46. To be effective, a system for the planning and management of water resources must be able to provide information on what kind and quality of water are available where, and on who is using the water and for what purposes. Therefore effective water management systems require adequate official surveys, inventories and cadastres of water sources and water-supplies, as well as up-to-date registers and records of water uses and discharges into waters, water rights, and beneficiaries of such rights, with their respective water allocations.

47. Cost recovery and the payment of common expenses are an important element in the functioning of any water-related service or activity. Cost recovery systems have been best implemented in countries where legal procedures for the compulsory collection of charges in default are available. For example, under such systems unpaid charges normally constitute a lien on the property where water services, such as irrigation, are provided. Furthermore, suspension of water-supplies may also be allowed under the law. Besides legal procedures, the implementation of an effective cost recovery system requires the introduction and permanent updating of registers of water users, in order to identify the user responsible for the payment of specific charges and tariffs. Effective cost recovery is of course conditioned by the ability of the user to pay. This implies that the estimates of the costs and benefits justifying a programme or project should prove correct in practice. A programme or project characterized by user inability to pay reflects, therefore, on the merits of the evaluation process.

48. Water users, and polluters, include government corporations and State-owned agencies. Unfortunately, in some countries, the enforcement, control and monitoring measures applied against these public users and polluters often tend to be lax. In many cases such corporations or agencies use water in the absence of a formal granting of water rights, or develop water projects without harmonizing with other users, or pollute scarce supplies without regard for environmental values or for those supplies' other uses. The

existence, and enforcement, of norms controlling the water-related activities of government agencies and entities or State-owned corporations would improve the performance of many countries' systems for planning and allocating limited water-supplies. Water pollution charges can be used to recover treatment costs and to induce the implementation of pollution-control measures. In addition, legal systems that provide broad and flexible principles on legal standing for individuals and groups that wish to initiate or be part of administrative or legal actions concerning environmental protection have proved very effective in dealing with water and environmental issues.

49. Many countries are currently transferring water-related services and activities from the public to the private sector. This transfer is more effective when paralleled by the presence of relevant legislation making provision for water protection and environmental concerns, and by the prescription of rules governing the provision to the public of services related to, or based on, water. The absence of such a legislative framework may eventually result in complicated problems including liability issues and those involving the interpretation of exploitation agreements.

50. The Committee may wish to consider whether a detailed report should be prepared on the trends in different countries in formulating appropriate and adequate legal and institutional frameworks for a sustainable system for water development.

III. UNITED NATIONS TECHNICAL COOPERATION ACTIVITIES IN THE NATURAL RESOURCES SECTOR

51. To date, the United Nations system, through its technical assistance agencies, has contributed to numerous approaches of developing countries to resources development. United Nations technical cooperation activities in the field of mineral and water development are carried out primarily by the Department of Economic and Social Development of the United Nations Secretariat. The United Nations Development Programme (UNDP) provides the bulk of the funding for those activities.

52. The technical cooperation programmes have been a mix of resource assessment and investment promotion. Some of the most common forms of technical cooperation have been related to the formulation of policies, preparation of legislation and subsidiary regulations, preparation of model agreements, organization of systematic investment promotion and bidding for prospects, negotiation of contracts, monitoring of contract implementation, support in arranging financing, building up of marketing capabilities, and restructuring of the Government's involvement in the natural resources sector. Most important, the Department of Economic and Social Development has carried out training programmes for nationals that expose them, internationally, to both the academic and the practical side of the specific activity in which they are involved.

53. The aim in all these cases of technical cooperation is to develop projects that will not only lead to the development of the resource concerned, thereby triggering economic growth through government revenue flows and foreign exchange earnings, but also result in social development through transfer of

technology, increased infrastructure and educational opportunities. Ultimately the main goal is to give a country the tools with which to sustain its own activities. In many developing countries projects have been devised and completed with the assistance of the United Nations that have resulted in the better organization of resource assessment, the drafting of necessary laws, the establishment of national capacity structures and the creation of a more attractive investment climate, all of which have allowed such countries to develop their resources in a manner that contributes to the economic and social well-being of the nation.

54. The exploitation of natural resources is intersectoral, that is, it involves and affects all other aspects of the nation's activities. As a result, it is necessary to stress that such exploitation must be approached as part of an overall development strategy interconnecting with other economic, social and environmental activities. Permanent sovereignty over a nation's natural resources necessarily must be considered within the context of the overall development of the policies and programmes of each country.

55. In this context, United Nations technical cooperation is intended to promote the principle of permanent sovereignty by strengthening the ability of countries to develop natural resources effectively and vigorously in accordance with their policy priorities. Both the form and substance of United Nations cooperation reflect the policies of Governments, since the activities involved are based on the requests of Governments and are financed and implemented with the full agreement of the Government concerned with respect to type of activity and main components of the assistance requested. It may be useful to bear in mind that within the context of a tripartite concept (involving Government, UNDP and the Department of Economic and Social Development of the United Nations Secretariat) the Government plays a decisive role in initiating, formalizing and implementing a given project.

56. The Department of Economic and Social Development has endeavoured to establish a technical assistance approach that is focused on the special requirements of each particular country. There are a number of already existing methods or mechanisms that have been used to reorient and develop meaningful policy and programme approaches for this purpose. The recently established facility for technical support services at the programme level (abbreviated as TSS-1), which is one such mechanism, deserves special mention.

57. The TSS-1 facility was established to contribute, inter alia, to the achievement of a sharper technical focus by the agencies and to the enhancement of agency technical support to developing countries in the upstream stages of the programme and project cycles. 5/ Established as a new initiative relating to national execution and the programme approach started in 1992 by UNDP and called for in General Assembly resolution 44/211, TSS-1 is a mechanism by which funding can be obtained by five executing bodies of the United Nations system (the Department of Economic and Social Development, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Industrial Development Organization (UNIDO), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Labour Organisation (ILO)) to study, appraise and recommend policies and programmes that can be used to formulate country initiatives and projects. TSS-1 provides an excellent opportunity for countries to obtain United Nations advice and

assistance in the development of sectoral policies and programmes, particularly in the natural resources sector.

58. The TSS-1 facility can be used to conduct studies at the country level, formulate sectoral programmes, participate in technical cooperation assessment and formulation exercises and thematic evaluations. It constitutes an initiative of the country Government conducted in cooperation with advisers from the various agencies of the United Nations system who are familiar with the country concerned and its needs.

59. The United Nations can contribute to a common thematic approach to the development of resources for the benefit of all while the sovereignty of a country is maintained for the purpose of determining the mode of development of its resources and the timing of that development. The use of TSS-1 studies and evaluations to formulate such an approach can be beneficial to developing countries in ensuring that the economic, scientific and technological objectives concerned with developing a given resource are achieved, while acknowledging and protecting the concerns of other countries. By furnishing assistance directed at the process of developing strategies and policies for resource development, the technical agencies of the United Nations system can also contribute in a major way to ensuring that the approach to operational activities called for by the General Assembly in its resolution 44/211 is accomplished.

60. Such an approach would ensure that Governments were not only likely to take into account other factors affecting the exploitation of natural resources, but also far more inclined to coordinate multilateral aid activities within their countries (since such activities would be more focused on and oriented towards certain objectives).

Notes

1/ See International Law Association, Report of the Sixty-second Conference, Seoul, 24 August to 30 August 1986 (London, International Law Association, 1987), Seoul Conference Resolutions: Legal Aspects of a New International Economic Order, paras. 5.1 and 5.2, pp. 6-7.

2/ See Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (A/CONF.151/26/Rev.1), Rio Declaration on Environment and Development, principle 2.

3/ See Official Records of the General Assembly, Forty-sixth Session, Supplement No. 10 (A/46/10), chap. III, sect. D (1).

4/ See ibid., chap. I, para. 11.

5/ See United Nations Development Programme, Guidelines for 1. Determination of Execution and Implementation Arrangements, 2. Successor Arrangements for Agency Support Costs, revision 1, October 1992, chap. III, para. 3.1.1.

UNITED
NATIONS

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Economic and Social Council

Distr.
GENERAL

E/C.7/1993/3
28 January 1993

ORIGINAL: ENGLISH

COMMITTEE ON NATURAL RESOURCES
First session
29 March-8 April 1993
Item 4 of the provisional agenda*

NEW TECHNIQUES, INCLUDING REMOTE SENSING, FOR IDENTIFYING, EXPLORING FOR AND ASSESSING MINERAL AND WATER RESOURCES

Report of the Secretary-General

SUMMARY

The present report provides information on the features of remote-sensing systems available through commercial outlets. It includes recent price schedules. It also summarizes the activities of the Department of Economic and Social Development with regard to remote sensing. In order to intensify its efforts to disseminate remote-sensing data, the Department has provided technical assistance to developing countries through seminars and workshops.

* E/C.7/1993/1.

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INTRODUCTION

1. At its second regular session in 1991, the Economic and Social Council took note of the report of the Secretary-General on information referral systems on satellite remote-sensing data (E/C.7/1991/7) and, in its resolution 1991/89, recommended that the Department of Technical Cooperation for Development of the Secretariat compile for dissemination to developing countries information on new data sets and the conditions under which such data can be obtained and the modalities for so doing. It also requested that the Secretary-General intensify his efforts to strengthen the capability of the developing countries in the application of remote-sensing techniques for the identification and subsequent exploration, exploitation and development of natural resources through workshops, seminars and training courses, to be organized at the regional or country level in developing countries. The Secretary-General was also requested to submit to the Committee on Natural Resources at its thirteenth session a report on the implementation of the resolution.

2. In response to those requests, the present report summarizes the appropriate action taken within available resources to implement resolution 1991/89.

3. Satellite remote sensing is a highly advanced technology which is being integrated into resources exploration programmes and environmental monitoring. In view of present and past developments in space, new data sets which lead to new products and services can be expected in the decades to come. The access to such real-time data processing is of particular importance to managers and decision makers concerned with environmental issues, disaster mitigation and other problems of global concern. The Department, over the years, has taken this technology into account in its projects, especially those for national resources development and environmental monitoring.

4. It has been pointed out that recent developments in user-friendly, low-cost image-processing hardware and software systems with high storage capacity, and the growth of geographic information systems (GIS), have expanded the capabilities and applications of remote-sensing computer systems for image-processing and image analysis. The operational use of these systems in developing countries is increasing and will contribute to meeting information needs.

5. Under agreements signed with the Earth Observation Satellite Company (EOSAT), an international Landsat data distribution network has been established to provide access to data under commercial agreements. Many developing countries have made a heavy capital investment in developing their own ground facilities. However, they now face a problem: continued data access is not guaranteed, either because of a cutback in the programme of the country providing the satellite services or because of a malfunction of the satellite with no prospect of an immediate replacement.

I. NEW DATA SETS

6. In the 1989 report of the Secretary-General on remote sensing (E/C.7/1989/2), it was suggested that, in view of the continuing financial constraints of the Organization, the Secretary-General should use, to the greatest extent possible, existing databanks and referral systems as a basis for assisting interested Member States. Current information on access to remote-sensing systems through commercial outlets is provided below. It updates information given in document E/C.7/1991/7. Owing to the rapid development of technology and the many services offered through private industry, only the major and primary outlets of satellite remote-sensing data will be covered. Mention of firm names and commercial products does not imply the endorsement of the United Nations.

7. The major tendency with respect to the final product of satellite information is to generate geocoded products - that is, precision-processed, map-projected satellite images that are free from distortions related to the sensor, the satellite, or the earth. Geocoded, Landsat, SPOT and other satellite data are precisely aligned to the reference system of an existing spatial database or serve as a reliable foundation for a new one. All corrections, including the elimination of terrain relief distortion, are applied to the imagery simultaneously.

8. Geocoded products provide image analysts, GIS and map users with a highly accurate and original cartographic data source for most areas of the world. Compatibility with an existing GIS or image-processing database or reference system is ensured, because each geocoded product is customized according to the client's requirements. Those may include map projection, reference earth ellipsoid, output pixel size, framing window and resampling method.

9. Satellite imagery can be grouped according to its spatial, spectral or temporal resolution, which determines the utility of the data for any given development or application in natural resource development. For instance, panchromatic SPOT imagery can offer a ground resolution of about 10 metres and multispectral SPOT imagery, 20 metres. Landsat TM imagery has a ground resolution of 30 metres.

10. The range of visible and near infra-red spectral bands sensed by satellite scanners offers earch science applications a wealth of band combinations with which to investigate the characteristic signatures or reflected/emitted electromagnetic energy returns of surface materials and vegetation.

11. With the exception of meteorological satellites, all earth resources satellites are polar-orbiting, passing over the same terrain at intervals of between 1 to 18 days. If cloud cover is minimal, it is possible to monitor environmental change by ordering subsequent scenes of a chosen area. Satellite data have been used in all resources areas and conditions related to the environment (see table 1).

Table 1. Applications of Landsat TM data

Agriculture, forestry and range resources	Land use and mapping	Geology	Water resources	Coastal resources	Environment
Discrimination of vegetation, crop, and timber types, range vegetation	Classification of land uses	Mapping of major geologic units	Determination of water boundaries and surface water areas	Determination of turbidity patterns and circulation	Monitoring surface mining and reclamation
Measure crop acreage	Cartographic mapping and map updating	Revising geologic maps	Mapping of floods and flood plains	Mapping shoreline changes	Mapping and monitoring of water pollution
Estimating crop yields	Categorization of land capability	Recognition of certain rock types	Determination of areal extent of snow and ice	Mapping of shoals and shallow areas	Determination of effects of natural disasters
Measure timber acreage	Monitoring urban growth	Delineation of unconsolidated rocks and soils	Measurement of glacial features	Mapping of ice for shipping	Monitoring environmental effects of man's activities
Forest harvest monitoring	Regional planning	Mapping igneous intrusions	Measurement of sediment and turbidity patterns	Tracing beach erosion	Assessing drought impact
Determination of range readiness and biomass	Mapping of transportation networks	Mapping recent volcanic surface deposits	Delineation of irrigated fields	Tracing oil spills and pollutants	Siting for solid waste disposal
Determination of vegetation vigor	Mapping of land/water boundaries	Mapping landforms	Inventory of lakes and wetlands	Bathymetry	Siting for power plants and other industries
Determination of vegetation stress	Flood plain management	Search for surface guides to mineralization	Estimating snow melt runoff		
Determination of soil conditions	Siting for transportation and transmission routes	Determination of regional structures			
Determination of soil associations		Mapping linears			
Assessment of grass and forest fire damage					
Wildlife habitat assessment					

Note: TM = thematic mapper.

A. EOSAT

12. In 1992 the Earth Observation Satellite Company (EOSAT) assumed its own operating costs, which relieved the United States Government of a $19 million subsidy. This was part of the effort to commercialize Landsat activities, which, under the Land Remote Sensing Act, will be funded privately after the launch of Landsat 6.

13. Landsat 6 is scheduled to be launched in 1993. It will maintain continuity with the data which have been collected since Landsat 1 was launched in 1972. In principle, Landsat 6 is similar to Landsat 3 and 4, but it includes several new features that will improve the data received from the Enhanced Thematic Mapper (ETM), with a 15-metre panchromatic-band co-registered with the seven multispectral bands and high- and low-gain settings for increased radio-metric resolution (table 2). New line products were made available by EOSAT in 1992.

14. The major change in the Thematic Mapper product line is the floating scene which provides images from any point along the Landsat path. The tape medium is also new. It makes digital imagery available on high-speed 8 mm tape cartridges.

15. Customers may order scene data for any 185-km by 170-km area along the same path. The price will be the same whether the scene is within or across Worldwide Reference System (WRS) row boundaries.

16. Digital sub-scenes (100 km by 100 km) and map sheets may also be taken from anywhere within a WRS path. The new 8 mm tape cartridge makes it possible to prepare a full scene on one tape, compared with as many as 12 tapes necessary in some current configurations.

17. Table 3 gives the prices as of October 1991.

Table 2. Band width specifications on the Landsat 6 ETM

Band number	Wavelength (μm)	Detectors	IFOV (μrad)	Ground resolution (metres)
PaN	0.50-0.90	SiPD (32)	18.5 x 21.3	13 x 15
1	0.45-0.52	SiPD (16)	42.5	30
2	0.52-0.60	SiPD (16)	42.5	30
3	0.63-0.69	SiPD (16)	42.5	30
4	0.76-0.90	SiPD (16)	42.5	30
5	1.55-1.75	InSB (16)	42.5	30
7	2.08-2.35	InSB (16)	42.5	30
6	10.4-12.5	HgCdTe (4)	170	120

Note: ETM = Enhanced Thematic Mapper.
IFOV = instantaneous field of view.

Table 3. EOSAT price sheet

Product	Price (United States $)
Thematic Mapper digital products	
Full scene	4 400
Quarter scene	3 100
Map sheet a/	2 500
Precision-corrected	1 100 extra
Terrain-corrected b/	450 extra
1,600 BPI format	10% extra
Duplicates	90/tape
Thematic Mapper photographic products	
Negative plus transparency c/	2 700
Print (each) d/	200
Multi-Spectral Scanner (MSS) products e/	
Digital full scene	1 000
Photographic color transparency	600
Color print (1:1 m)	1 000
Black/white transparency (1:1 m)	155

Source: Earth Observation Satellite Company, 4300 Forbes Boulevard, Lanham, Maryland 20706-9954.

Note: CCT = computer-compatible tape.
BPI = bytes per inch.

a/ Available on 8 mm cassette or CCT.

b/ Requires precision correction.

c/ Full scenes are path-oriented; quarter scenes and map sheets are map-oriented.

d/ Prints require negative and transparency.

e/ Less than two years old.

B. Russian satellite imagery

1. DD-5 digital imagery

18. Satellites produced by the Russian DD-5 system, were launched in spacecraft such as Cosmos 1546. Images were captured with a 6.000-element linear image sensor and processed with an 8-bit processor before being transmitted to Earth in 8-second bursts. The system's focal length was approximately 5 metres and the CCD array in the focal plane was about 8 cm long. 1/

19. The Government of the Russian Federation has declassified and made available to the public sector two-metre-resolution digital satellite imagery. The imagery originally had a higher resolution but for commercial purposes was degraded to two metres. The data were processed by digitizing a photographic product using a very large pixel kernel size. They are in a panchromatic mode and are presented on computer-compatible tapes with 8-bit data. Each scene contains approximately 40 megabytes of data, consists of 6,500 pixels by 6,500 lines and covers an area of 13^2 kilometres. Currently, the data is formatted to be read by computer-based image-processing systems.

20. Although the data have not been geo-referenced, there is no photographic distortion in them. The archival databank is very extensive, and almost all data are from 1989 or later. New acquisition data can be acquired and delivered to a customer within 45 days. Currently, data are available for all parts of the world except for those taken over Russian.

21. Prices are available upon request, and payment must be received before an order is processed. The distributor, Central Trading Systems, guarantees that the data will be delivered as ordered or the money will be refunded. 2/

2. KVR-1000 photographs

22. Two-metre photographs are the latest products to become available through Central Trading Systems from Russia. The high resolution is comparable to that of low-altitude aerial photography. The characteristics of KVR-1000 photography are listed below.

Frame format	180 x 180 mm
Scale (at a survey altitude of 200 km)	1:220,000
Longitudinal overlap	0%
Width of survey band (altitude of 200 km)	24 miles
Resolution	2 metres
Type of film used	Panchromatic, high density

23. Only photographic products - film negatives or positives, and prints in black and white - are available at this time. Enlargements of up to 25 times

are possible. Each image is accompanied by the photogrammetric and camera system data, allowing accurate rectification to maps and the removal of any lens distortion that may be present. Normal delivery time is 15-20 days. The price of film products, negative or positive, is $3,000; the price of a contact print is $1,000.

C. ALMAZ data

24. The ALMAZ-1 Synthetic Aperture Radar (SAR) provides the first commercially available satellite AR images of Earth. ALMAZ-1 SAR data complement or provide an alternative to those from other remote-sensing satellite systems. Some of the benefits are: weather independence, day- or night-time acquisitions that are independent of the Sun's illumination angle, identification of surface features, and potential differentiation of vegetation and surface material characteristics. By combining these benefits with the option to a user-specified range of the look angle, clients are able to acquire and use ALMAZ-1 SAR data that are optimized for applications as diverse as oil and gas exploration and oceanographic studies. ALMAZ-1 data are also used for forestry, urban planning, mapping and environmental monitoring.

25. The ALMAZ Corporation, a susidiary of the Space Commerce Corporation, was established to manage the world-wide marketing of imagery from the Soviet synthetic aperture radar satellite, ALMAZ.

26. The standard image covered is 40 X 40 kilometres. The price is $1,600 plus courier shipment and handling. An image covering 40 X 300 km can be produced.

27. Two levels of image are available: level A: digital recording of the initial image on magnetic tape combining parts of the initial image into the whole image; and level B: combining level-A processing with geometric/radiometric correction plus geographical referencing.

28. The initial radio-hologramme or processed data on photographs in the above formats has a resolution of about 20 m with six shades of gray.

29. The technical details are as follows:

Aperture probing pulse frequency	
Hologram	3 000 Hz
Synthesized image	1 500 Hz
Wavelength	9.6 cm
Polarization of emitted pulses	HH
Pulses discrete frequency	
Narrow band	28.8 MHz
Wide band	20.16 MHz

D. SPOT data items and options

30. Before ordering SPOT data items, each client is required to sign an agreement on general terms and conditions. This is done only once, and the agreement is kept on file at the SPOT Image Corporation. All orders are placed by completing a licence request form on which the client specifies the parametres under which the data items are to be produced (see annex). The order is filled under the terms stated in the agreement. Requests for SPOT catalogue searches, to determine whether the required data exist in the SPOT archive, are made through an inquiry form. If the required data do not exist in the archive, the client may complete the SPOT Acquisition Programming Request Form which allows the client to specify a set of imaging parametres under which imagery will be acquired to meet the client's needs.

31. Each SPOT scene is recorded in either the panchromatic (P) mode or multispectral (XS) mode (table 4). Panchromatic scenes have 10-metre ground resolution and a spectral resolution ranging from .51 µm to .73 µm. The number of pixels per line varies between 6,000 and 10,200, depending on the angle of incidence. The number of lines per scene varies between 6,000 and 10,200, depending on the level of processing applied to the imagery.

32. Multispectral images are composed of three spectral bands: XS1, XS2 and XS3, with spectral resolutions as shown in table 4. Each of the three bands has 20-metre ground resolution with 3,000-5,100 pixels per line, depending on the angle of incidence, and 3,000-5,100 lines per scene, depending on the processing level.

Table 4. Spectral and ground resolution of SPOT data

Spectral mode	Wavelength band (µm)	Resolution (metres)
Panchromatic	.51-.73	10
Multispectral		
XS1	.50-.59	20
XS2	.61-.68	20
XS3	.79-.89	20

33. In addition to SPOT data, the SPOT Image Corporation markets ALMAZ radar image products and Sojuzkarta data. The price schedule for all these products is given in table 5.

Table 5. SPOT product fee schedule*

1. Standard SPOT Products

		Panchromatic/Multispectral
Computer Compatible Tapes (CCT)	*Level 1A, 1B* (Full Scene) 6250 or 1600 bpi	$2,450
Film (30% discount w/corresponding CCT)	*Level 1A, 1B* 1:400,000 (Full Scene) 1:200,000 (Full Scene) 1:200,000 (1/4 Scene) 1:100,000 (1/4 Scene)	 $1,800 $1,800 $1,800 $1,800
Photographic Prints	When ordered alone When ordered with corresponding Level 1 CCT or film	$950 $300

2. SPOTView™ – GIS related products

	Digital	Photographic Print
7.5 – (corresponds to USGS 7.5 minute map series) P – Panchromatic XS – Multispectral	$950	$950 (1:24,000 7.5 XS not available)
15 – Four 7.5 minute SPOTViews creating 15 x 15 minute area P – Panchromatic XS – Multispectral	$2,000	$2,000 (1:50,000 or 1:63,360)
FS – Full SPOT scene (37 x 37 miles) P – Panchromatic XS – Multispectral	$3,000	$3,000 (1:100,000)

3. Other SPOT Products

	Digital	Photographic Film/Print
SPOT Digital Terrain Model (DTM) (60%-100% of full scene size/ minimum of 820 sq. mi.)	$15,000	
SPOT Quarter scene DTM	$10,000	
SPOT BasinView™ - complete coverage of any geologic basin in the world Panchromatic only	$1.25/sq. mi. minimum 2,500 sq. mi.	

* Effective August 1992.

II. EFFORTS TO STRENGTHEN THE CAPABILITIES OF DEVELOPING COUNTRIES

A. Interregional seminars

34. Recognizing the urgent needs of technology transfer to developing countries and in order to implement Economic and Social Council resolution 1991/89, the United Nations, in cooperation with the International Society for Photogrammetry and Remote-Sensing, convened an interregional seminar for developing countries in Washington, D.C., from 2 to 14 August 1992. Three sessions were devoted to issues relating to the viewpoints of manufacturers and users of remote-sensing technology, the educational needs of developing countries, the transfer process, and the integration and management of new technologies in recipient countries.

35. The first session focused on the need to accelerate the transfer of new mapping technologies and remote-sensing devices appropriate for capable end users. Experts examined the role of consultants, the importance of guidelines for State policies in the science and technology sector, training needs and the need to avoid "testing" new technology in developing countries, and ways in which new technologies could be integrated into a nation's economy, educational opportunities, infrastructure, living standards, habits and attitudes towards technologies.

36. The second session dealt with educational needs. Experts observed, among other things, that: the growth of modern mapping sciences in poorer countries had tended to rely on outsiders and were rarely controlled by indigenous scientists; developing countries needed to place more emphasis on applications and systems design; and there was a need for cooperation between specialists in different disciplines. Participants related experiences in Ethiopia, China and Jordan.

37. Speakers at the symposium included representatives from Argentina, Canada, China, Egypt, India, Indonesia, Kenya, Malawi, the Netherlands, Pakistan, Poland, Syrian Arab Republic, the United Kingdom and the United States.

B. Space Congress

38. The Department of Economic and Social Development also participated in the Space Congress which was held in Washington, D.C., from 25 August to 5 September 1992. More than 5,000 leading scientists attended, from developing as well as industrialized countries. The general theme was Discovery, Exploration and Cooperation. The event was co-sponsored by the United Nations, the International Astronautical Federation (IAF) and the Committee on Space Research (COSPAR). It was hosted and organized by the American Institute of Aeronautics and Astronautics (AIAA) and held under the auspices of the National Academy of Sciences and the National Aeronautics and Space Administration (NASA). The Congress was billed as the premier event for

International Space Year and provided a forum for many cooperative projects initiated by the Space Agency Forum for International Space Year (SAFISY).

39. Leading scientists and space policy makers took part in lectures and panel discussions. They reviewed the latest results and issues in the areas of space science, engineering, law and policy, which will influence space programmes into the next century.

40. In a session devoted to the importance of space technology for disaster reduction in developing countries, the Department presented a paper pointing out that technologies for humanitarian purposes had so far been underutilized. Natural disasters claimed hundreds of thousands of lives and caused billions of dollars worth of losses to housing and infrastructure in the developing world every year. Participants noted that much of that pain and loss could be avoided if populations in the world's poorest countries had adequate warning of impending threats, such as storms, floods, earthquakes, drought and insect infestations, which posed a constant threat to their survival.

C. Training courses

41. The Department of Economic and Social Development is preparing, with the office of Outer Space Affairs, a training programme on the use of microwave sensors in the Sahel region. The training course has the following objectives:

(a) To provide the understanding of remote-sensing techniques and specifically of remote-sensing applications to renewable resources and environment. That is: RS systems and available products, the field and laboratory work associated with RS techniques and the need and utilization of auxiliary external data;

(b) To provide detailed information on relevant projects on renewable resources management in the Sahel area;

(c) To provide an overview and practical utilization of image-processing tools and interpretation techniques;

(d) To expose the trainees to practical projects in application areas.

42. These projects respond to the critical economic and ecological situation of the Sahelian countries and to their wish to have more information and more knowledge on microwave sensors for the monitoring of renewable resources and the environment. Substantive matters, reaching the appropriate local policy makers, are expected to be treated in depth. The project is being carried out at the European Research Institute (ESRIN) of the European Space Agency (ESA, in Frascati, Italy) and will provide for the participation of Francophone technicians from the Sahel region. The training course is to be held from 19 to 30 April 1993.

43. Similar arrangements are being made for a training course in the use of microwave remote sensing for the countries in Latin America.

Notes

1/ Earth Observation Magazine (November 1992).

2/ For further information, contact Velon H. Minshew, Central Trading Systems, 611 Ryan Plaza Drive, Suite 700, Arlington, Texas 76011. Tel. (817) 459-0423; Fax (817) 459-0721.

Annex

License request cover sheet

SPOT Image Corporation
1897 Preston White Drive, Reston VA 22091-4368
(703) 620-2200 Telecopier (703) 648-1813

Licensee ID		Your P.O. Number	Number of License Requests Attached	Date
1 0 0 1 0 0				

Licensee Name	Authorized Signature
Contact Name/Data End User	☐ Check here if Joint Venture and refer to instruction 4.
Phone	Total Cost of Items Requested $
If an alternate shipping address is required please indicate in this space:	
	Surcharge for Rush Services $
	Virginia Residents ONLY add 4.5% State Tax $
	TOTAL $

Please Check SPOT Data Application

AGRICULTURE
- ☐ Domestic Inventory
- ☐ Foreign Inventory
- ☐ Yield Estimation
- ☐ Farm Management and Monitoring

GEOLOGY
- ☐ Lithologic Mapping
- ☐ Cadastral Mapping
- ☐ Structural Mapping
- ☐ Logistical/Environmental Planning

FORESTRY
- ☐ Inventory
- ☐ Deforestation Mapping
- ☐ Road Update Mapping
- ☐ Resource Planning

URBAN PLANNING
- ☐ Land Use Mapping
- ☐ Site Selection
- ☐ Regional Planning
- ☐ Industrial Development

DEFENSE
- ☐ Target Identification
- ☐ Terrain Analysis
- ☐ Surveillance
- ☐ Simulations

ENGINEERING & CONSTRUCTION
- ☐ Site Selection
- ☐ Environmental Impact Assessment
- ☐ Corridor Selection and Assessment
- ☐ Infrastructure Mapping

LAND USE
- ☐ Disaster Evaluation
- ☐ Infrastructure Mapping
- ☐ Monitoring Change Detection
- ☐ Inventory

ENVIRONMENT
- ☐ Wetlands Management
- ☐ Surface Mining Evaluation
- ☐ Wildlife Habitat Mapping
- ☐ Pollution Site Identification and Monitoring

UTILITY NETWORKS
- ☐ Infrastructure Mapping
- ☐ Corridor Monitoring
- ☐ Area Economic Analysis
- ☐ Environmental Compliance

☐ **Other** _____

Additional Information:

☐ NGTCA ☐ DA/PP ☐ OP ☐ NSD ☐ VAGTCA ☐ IKIN ☐ SPECI ☐ SD

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UNITED
NATIONS

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Economic and Social Council

Distr.
GENERAL

E/C.7/1993/4
5 February 1993

ORIGINAL: ENGLISH

COMMITTEE ON NATURAL RESOURCES
First session
29 March-8 April 1993
Item 6 of the provisional agenda*

ACTIVITIES OF THE UNITED NATIONS SYSTEM IN THE FIELD OF WATER RESOURCES

Report of the Secretary-General

SUMMARY

This report presents in summary form the activities of the organizations of the United Nations system in the field of water resources. It describes the various coordination mechanisms - in particular, the ACC Intersecretariat Group for Water Resources, the Steering Committee for Water Supply and Sanitation, and the Collaborative Council for Water Supply and Sanitation, at the global level, and the inter-agency mechanisms established by ECA and ESCAP at the regional level. It also outlines the nature of the joint activities being undertaken by the organizations concerned with regard to information management, water resources and urban development, integrated rural water management, and integrated water resources development and management, and provides information concerning meetings, conferences and symposia held during the past three years. It draws attention to the outcomes of the Global Consultation on Safe Water for the 1990s, the Symposium on Strategy for Water Resources Capacity-building, and the International Conference on Water and the Environment.

* E/C.7/1993/1.

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INTRODUCTION

1. The present report presents an overview of the involvement of the organizations of the United Nations system in the field of water resources. Section I reviews the scope and nature of the involvement; section II describes the existing arrangements for system-wide cooperation at the global and regional levels, and section III provides information on key conferences and meetings that took place during the period 1990-1992. Particular attention is given to the outcome of the International Conference on Water and the Environment, held in Dublin, Ireland from 26 to 31 January 1992, which had the objective of providing technical inputs to the chapter on fresh-water resources in Agenda 21. 1/

2. The activities of each organization are set in accordance with their specific mandates, and their programmes as authorized by their respective intergovernmental bodies. Consequently, section I of the report endeavours to discuss the nature and complexities of the interrelationships between programmes of the various organizations rather than describe the actual programmes. This review is supplemented by a conference room paper entitled "The United Nations organizations and water", which provides more detailed information as to the programmes of each organization.

I. ACTIVITIES OF THE UNITED NATIONS SYSTEM IN WATER RESOURCES

3. Twenty-one organizations within the United Nations system, including the regional commissions, are active, to various degrees and through various means, in the field of water resources. These organizations are:

United Nations

United Nations Secretariat, Department of Economic and Social Development

United Nations Children's Fund (UNICEF)

United Nations Development Programme (UNDP)

United Nations Environment Programme (UNEP)

United Nations University (UNU), Programme on Natural Resources in Africa

Economic Commission for Africa (ECA)

Economic Commission for Europe (ECE)

Economic Commission for Latin America and the Caribbean (ECLAC)

Economic and Social Commission for Asia and the Pacific (ESCAP)

Economic and Social Commission for Western Asia (ESCWA)

United Nations Centre for Human Settlements (HABITAT)

Office of the United Nations Disaster Relief Coordinator (UNDRO)

International Research and Training Institute for the Advancement of Women (INSTRAW)

World Food Programme (WFP)

Specialized agencies and related organizations

Food and Agriculture Organization of the United Nations (FAO)

United Nations Educational, Scientific and Cultural Organization (UNESCO)

World Health Organization (WHO)

World Bank

World Meteorological Organization (WMO)

United Nations Industrial Development Organization (UNIDO)

International Atomic Energy Agency (IAEA).

4. Table 1 below provides a synoptic view of the areas of concern of each of the organizations. Activities have been divided into eight specific sectors: agricultural water use; drinking water supply; industrial water use; hydropower; navigation; flood control; drought management; and multipurpose water use. The inclusion of an organization in any given cell represents interest or concern with that sector and not necessarily specific ongoing activities at any given time.

Table I. Involvement of the organizations of the United Nations system in the field of water resources

Organization	Agricultural water use	Drinking water supply	Industrial water use	Hydro	Navigation	Flood control	Drought management	Multi-purpose
Secretariat	X	X	X	X	X	X	X	X
UNICEF		X						
UNDP	X	X	X	X	X	X	X	X
UNEP	X	X	X			X	X	X
UNU	X	X	X	X	X	X	X	X
ECA	X	X	X	X	X	X	X	X
ECE	X	X	X	X	X	X		X
ECLAC	X	X	X	X	X	X	X	X
ESCAP	X	X	X	X	X	X	X	X
ESCWA		X				X	X	X
HABITAT		X	X			X		X
UNDRO						X		
INSTRAW	X	X		X				X
WFP	X	X				X	X	X
FAO	X					X	X	
UNESCO				X		X	X	X
WHO	X	X	X					X
World Bank	X	X	X	X	X	X	X	X
WMO						X	X	X
UNIDO			X	X				X
IAEA	X		X					X

5. A more detailed presentation of the nature of the involvement of the organizations is presented in annex I, which combines the eight activities outlined above into a matrix with 15 development and management functions - namely: surface water hydrology; groundwater hydrology; surface water quality monitoring; groundwater quality monitoring; information on water use; surface water development; groundwater development; waste water reuse; integrated water resources management; water use management; waste water management; strengthening of institutions; legislation; education and training; and human resources development.

6. As shown in the annex, there is a complex interrelationship among the organizations of the United Nations systems in the field of water resources. Each organization brings a different point of view either in terms of the nature of the substance, the geographical coverage, or both. Because the field of water resources could not possibly be divided into mutually exclusive categories, the mandates of the various organizations inevitably contain numerous grey areas, leading to overlap and at times to duplication. At the same time, however, the very fact that organizations bring a variety of perspectives to the field offers opportunities for bringing about a complementarity of approaches in a synergetic manner.

7. The preparatory work for the United Nations Water Conference, held in Mar del Plata, Argentina, in 1977, and recommendations contained in the Mar del Plata Action Plan, 2/ provided the basis for increased efforts for coordination and cooperation. These efforts have been conducted in terms of the implementation of the Action Plan, the International Drinking Water Supply and Sanitation Decade, and the preparatory process for the United Nations Conference on Environment and Development.

II. COORDINATION OF THE ACTIVITIES OF THE UNITED NATIONS SYSTEM IN WATER RESOURCES

A. Coordination at the global level

1. ACC Intersecretariat Group for Water Resources

8. In 1979, after the United Nations Water Conference (1977), and pursuant to Economic and Social Council resolution 1979/68, in which the Council urged the Administrative Committee on Coordination (ACC) to make the necessary arrangements to intensify interorganizational coordination and cooperation in the field of water resources, the ACC Intersecretariat Group for Water Resources was established, with the following terms of reference:

(a) Cooperation in the monitoring of the progress being made in the implementation by Governments of the Action Plan adopted by the United Nations Water Conference. The Group serves as a focal point at the global level for the gathering, analysis and synthesis of information in order to furnish the relevant governing bodies of the organizations concerned with the necessary information to undertake their reviews of the progress in the implementation of the Mar del Plata Action Plan. Examples in this respect are the report presented to the General Assembly at its forty-fifth session (1990), on the achievements of the International Drinking Water Supply and Sanitation Decade, 1981-1990 (A/45/327), and the report to the Committee on Natural Resources at

is twelfth session (25 March-5 April 1991) on strategies and measures for the implementation of the Mar del Plata Action Plan in the 1990s (E/C.7/1991/8);

(b) Promotion of cooperation and joint planning of the water-related programmes of the United Nations system and review of their implementation. The Group is entrusted with the responsibility of drawing up system-wide plans encompassing joint action by the many organizations concerned. It is also responsible for determining the issues of current significance to be covered in the relevant reports;

(c) Assistance in coordinating the water-related activities of the United Nations system at the country and regional levels.

9. The Group has been instrumental in promoting cooperation in the implementation of the Mar del Plata Action Plan. In particular, it provided the vehicle for the formulation of a strategy for the implementation of the Action Plan in the 1990s, the organization of the International Conference on Water and the Environment (Dublin, Ireland, 26-31 January 1992), and the provision of inputs by the organizations of the system to the drafting of chapter 18 of Agenda 21 1/ of the United Nations Conference on Environment and Development, concerning fresh-water resources.

10. A formal session of the Group is held once a year, and ad hoc informal meetings of the Group or its working groups are convened as needs arise.

2. Steering Committee for Water Supply and Sanitation

11. After the launching in 1980 of the International Drinking Water Supply and Sanitation Decade, the Steering Committee for Cooperative Action for the International Drinking Water Supply and Sanitation Decade was established. At the end of the Decade, the Committee evolved into the Steering Committee for Water Supply and Sanitation, with a view to continuing the momentum gathered during the Decade. The Steering Committee is designed to promote water supply and sanitation at the global level; assess needs and monitor progress towards the achievement of national, regional and global objectives; and ensure effective consultation among the organizations of the system. The Steering Committee also provides a link with the Collaborative Council for Water Supply and Sanitation.

12. In view of the inextricable connection between issues relating to drinking water supply and sanitation and to other competing uses in a holistic approach to water resources development and management, there exists a close relationship between the Steering Committee for Water Supply and Sanitation and the Intersecretariat Group for Water Resources. Normally, the meetings of the Steering Committee are held in conjunction with those of the Intersecretariat Group, and its main conclusions and agreements are reported to the latter.

3. Other mechanisms for global coordination

13. Apart from the ACC Intersecretariat Group and the Steering Committee, other arrangements, involving two or more organizations of the system, exist to deal with specific aspects of water resources. They are summarized in annex II.

4. Collaborative Council for Water Supply and Sanitation

14. In addition to the above-mentioned mechanisms within the United Nations system, mention needs to be made of the Collaborative Council for Water Supply and Sanitation in view of the innovative role it plays in promoting cooperation in this field between the organizations of the system and other organizations.

15. The membership of the Collaborative Council includes, in addition to the organizations of the United Nations system active in the field of water supply and sanitation, a wide spectrum of external support agencies, intergovernmental and non-governmental organizations, and professional organizations. The Council meets every two years. It has an independent secretariat financed jointly by UNDP and external support agencies and is housed at WHO headquarters in Geneva. Priority attention is given by the Council to the promotion of collaboration among sector professionals, provision of assistance in the creation of greater public awareness of sector needs, encouraging applied research, supporting investigation of specific sector issues, and the provision of appropriate forums for the discussion of sector issues. The Council has established working groups on information, education and communication, information management, applied research, gender issues in the water supply and sanitation sector, urbanization, and operation and maintenance.

B. Coordination at the regional level

16. Subsequent to the United Nations Water Conference, the Economic and Social Council adopted resolution 1979/67 on institutional arrangements for international cooperation at the regional level in the implementation of the Mar del Plata Action Plan.

17. In response to the resolution, in 1978 ESCAP established the Interagency Task Force on Water for Asia and the Pacific. The Task Force meets twice a year to coordinate water-related activities undertaken in the region by the organizations concerned. Following an inter-agency meeting convened in Addis Ababa in July 1992 ECA established the Interagency Group for Water Resources Activities in Africa. The Group's aim is to coordinate and harmonize water resources activities in Africa at the subregional and regional levels; promote collaboration and joint activities; and gather, compile and disseminate information on water resources activities in Africa.

C. Joint efforts related to the Mar del Plata Action Plan and to Agenda 21

18. The report of the Secretary-General to the Committee on Natural Resources at its twelfth session, "Strategies and measures for the implementation of the Mar del Plata Action Plan in the 1990s", summarized the analyses, conclusions and recommendations that stemmed from a series of regional assessments conducted on critical issues relating to the implementation of the Plan. It was undertaken with the financial support of UNDP and with the full participation of the regional commissions. The regional assessments concentrated on water resources assessment (with WMO and UNESCO as lead agencies); water quality (with WMO/UNEP as lead agencies), water for agriculture (with FAO as the lead agency), and water resources management (with

the former Secretariat Department of Technical Cooperation for Development and the regional commissions acting as the lead agencies). In addition, a study on Capacity-building, dealing with issues relating to institutional arrangements and human resources development, was completed by UNDP on behalf of the ACC Intersecretariat Group.

19. The regional studies on water resources assessment, water quality and water for agriculture were followed by meetings with experts in order to review the results and formulate recommendations. In addition, an International Action Programme on Water and Sustainable Agricultural Development was formulated by FAO, in consultation with a number of experts, organizations of the United Nations system and bilateral organizations. In June 1991, UNDP, in cooperation with the International Institute for Hydraulic and Environmental Engineering, convened, in Delft, Netherlands, a symposium "A Strategy for Water Resources Capacity Building". The Delft Declaration contains a set of action recommendations concerning capacity-building. The Global Consultation on Safe Water and Sanitation for the 1990s (New Delhi, India, September 1990) and the report of the Secretary-General on the achievements of the International Drinking Water Supply and Sanitation Decade, 1981-1990 (A/45/327), prepared in consultation with the organizations concerned, made a number of recommendations for action into the 1990s with regard to drinking water supply and sanitation.

20. The International Conference on Water and the Environment, organized by the organizations of the United Nations system focused its attention on six main issues - namely, integrated water resources development and management; water resources assessment and the impact of climate change on water resources; protection of water resources, water quality and aquatic ecosystems; water and sustainable urban development and drinking water supply and sanitation in an urban context; water for sustainable food production and rural development and drinking water supply and sanitation in a rural context; and mechanisms for implementation and coordination at the international, national and local levels. Similarly, chapter 18 of Agenda 21 1/ focuses on issues relating to integrated water resources development and management; water resources assessment; protection of water resources, water quality and aquatic ecosystems; drinking water supply and sanitation; water for sustainable urban development; water for sustainable food production and rural development; and the impact of climate change on water resources. In both cases, questions related to capacity-building were considered under each issue.

21. As a follow-up to the activities carried out in connection with the formulation of the strategy for the 1990s, and pursuant to Agenda 21, the members of the ACC Intersecretariat Group for Water Resources are continuing their joint efforts through working groups on information management (E/C.7/1993/7) and on water resources and urban development. The latter working group, under the chairmanship of HABITAT and with the participation of WHO, World Bank, UNESCO and UNDP, is entrusted with recommending options for inter-agency collaboration in implementing follow-up activities on urban water issues stemming from Agenda 21. Its main objective will be to identify policy orientations, objectives, target groups, and the scope and coverage of programmes and activities and their relation to the issues emerging from Agenda 21. In addition, with regard to rural development, FAO, jointly with WHO, UNDP, UNICEF and the World Bank, is convening an expert consultation on integrated rural water management, to be held at FAO headquarters from 15 to 19 March 1993. The objectives of the expert consultation will be to develop

strategies to promote integrated rural water resources planning and development, identify priority areas for technical assistance to developing countries and prepare guidelines for integrated rural water resources management. With regard to integrated water resources development and management, the Department of Economic and Social Development and the World Bank were entrusted with the task of preparing an outline for a strategy for the management of water resources as a basis for sustainable development.

III. MEETINGS, SEMINARS AND CONFERENCES CONVENED BY THE ORGANIZATIONS OF THE UNITED NATIONS SYSTEM

22. Annex III lists various meetings, seminars, symposia and conferences convened by the organizations of the United Nations system, either individually or jointly, during the period 1990-1992. All of the meetings covered a wide variety of subjects of either a sectoral or a multidisciplinary nature.

A. Global Consultation on Safe Water and Sanitation for the 1990s

23. The Global Consultation on Safe Water and Sanitation for the 1990s was sponsored by UNDP in cooperation with other organizations of the system and hosted by the Government of India. The Consultation, which was held in New Delhi from 10 to 14 September 1990, had as its major objective promoting awareness of the main issues to be faced with regard to water supply and sanitation in the 1990s and to reach a consensus on strategic actions needed to accelerate progress. It produced the New Delhi Statement which was submitted to the General Assembly at its forty-fifth session during its discussions of the achievements of the International Drinking Water Supply and Sanitation Decade (A/45/C.2/3). In resolution 45/181 of 21 December 1990 the General Assembly endorsed the four principles contained in the Statement, as follows:

(a) Protection of the environment and safeguarding of health through the integrated management of water resources and liquid and solid wastes;

(b) Institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behaviour, and the full participation of women at all levels in sector institutions;

(c) Community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes;

(d) Sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies.

B. Symposium on Strategy for Water Resources Capacity-building

24. Issues concerning human resources and institutional development were dealt with at the Symposium on a Strategy for Water Sector Capacity-building, convened by UNDP in Delft, the Netherlands, from 3 to 5 June 1991, and hosted by the International Institute for Hydraulic Engineering. The symposium

stressed the concept of water as a finite resource. It noted that the scarcity of the resource, the threats of water resources development to the environment and the conflicting interests of the water users imply that water resources planning and management should be an integral part of overall national economic planning. The objectives and strategies for the water sector should be derived from the national planning process.

25. Capacity-building was defined at the symposium as containing the following three basic elements:

(a) Creating an enabling environment with appropriate policy and legal frameworks;

(b) Institutional development, including community participation;

(c) Human resources development and the strengthening of managerial systems.

26. With regards to a strategy for water sector capacity-building, the Delft Declaration states that it involves the following approaches:

> "Developing improved policy and legal frameworks, institutional development and a commitment to development of human resources and managerial systems for the sector;
>
> Managing water and environmental resources, including modifying demand by pricing, conservation, reclamation and reuse of waste water, thereby reducing fresh water demands and pollution;
>
> Having the ESAs [External Support Agencies] adopt capacity-building as an essential element of their assistance efforts, including such initiatives as supporting community and water user associations, on farms and in the cities, so that they can participate productively in investments made on their behalf; continued attention needs to be given to the pivotal role of women in water related activities, and their proven capabilities to fulfil managerial tasks at all levels;
>
> Urging governments to coordinate ESA activities in their countries, and encouraging the ESAs themselves to coordinate their agendas;
>
> Involving, where appropriate, the private sector in managing or providing water related services;
>
> Encouraging local and foreign universities, institutes, consulting organizations, professional associations and others to participate in capacity-building as is most appropriate to their own capacities; and ESAs are urged to facilitate this effort;
>
> Encouraging countries to conduct water sector assessments; these assessments must include the need for capacity-building in addition to traditional technical, social and economic aspects; and
>
> Creating awareness of the vital role and finiteness of water on the part of decision-makers and the public at large." 3/

27. The Symposium recognized that "each country and region has its specific characteristics and requirements with respect to its water resources situation and its institutional framework. Therefore operational strategies must be tailor-made. To achieve this it is recommended that, based on the insights emerging from this Symposium, water sector assessments be initiated to provide a basis for country strategies." 4/

C. International Conference on Water and the Environment

28. The International Conference on Water and the Environment: Development Issues for the 21st Century, was convened in Dublin, Ireland, from 26 to 31 January 1992. The Conference was attended by government-designated experts and was part of the preparatory process for the United Nations Conference on Environment and Development. Its main objectives were to assess the current status of the world's fresh-water resources in relation to present and future water demands and to identify priority issues for the 1990s; to develop coordinated intersectoral approaches to managing those resources by strengthening the linkages between the various programmes; to formulate environmentally sustainable strategies and action programmes for the 1990s and beyond to be presented to the Earth Summit; and to bring the above issues, strategies and actions to the attention of Governments as a basis for national programmes and to increase awareness of the environmental consequences and developmental opportunities in improving the management of water resources.

29. The subject areas of the Conference, coincided with those of chapter 18 of Agenda 21, with minor differences in treatment. The Conference dealt with drinking water supply and sanitation in the context of water and sustainable urban development and water and sustainable food production and rural development. Issues concerning the impact of climate change on water resources were included under water resources assessment. Chapter 18 of Agenda 21, on the other hand, has separate sections for drinking water supply and sanitation and for the impact of climate change on water resources.

30. The Conference recognized that "Scarcity and misuse of fresh water pose a serious and growing threat to sustainable development and protection of the environment. Human health and welfare, food security, industrial development and the ecosystems on which they depend, are all at risk, unless water and land resources are managed more effectively in the present decade and beyond than they have been in the past". 5/ Consequently, the participants at the Conference recognized the need for fundamental new approaches to development and management which can only be brought about through political commitment and involvement from the highest levels of government to the smallest communities. They agreed on the need for concerted action to reverse the present trends of overconsumption, pollution and rising threats from droughts and floods, and set out recommendations for action at local, national and international levels based on the following four principles:

1. "Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.

"Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with

protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.

2. "Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

"The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects."

3. "Women play a central part in the provision, management and safeguarding of water.

"This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation, in ways defined by them."

4. "Water has an economic value in all its competing uses and should be recognized as an economic good.

"Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources." 6/

31. The participants formulated recommendations based on the four principles focusing on the alleviation of poverty, protection against natural disasters, water conservation and reuse, sustainable urban development, agricultural production and rural water supply, protecting aquatic ecosystems, resolving water conflicts, the enabling environment, the knowledge base, and capacity-building.

32. The report of the Dublin Conference, including the Dublin Statement, was submitted to the Preparatory Committee of the United Nations Conference on Environment and Development at its fourth session. The results of the Dublin Conference were not incorporated formally into the proceedings of either the Preparatory Committee or of the United Nation Conference on Environment and Development itself, since the contents of Agenda 21 are the result of a negotiated text achieved by consensus. The four principles enunciated in the Dublin Statement and some of the issues raised at Dublin on which a consensus could not be achieved at either Conference were not included in Agenda 21.

33. Yet, as can be seen by comparing Agenda 21 with the Dublin Statement, there is a close relationship between the principles and action recommendations contained in each of the subject areas of the Statement and those in chapter 18

of Agenda 21. Both recognize the importance of taking a holistic approach to water resources and the need for their integrated development and management.

34. However, the Statement is more explicit with regards to the concept of water as an economic good. Whereas Agenda 21 implicitly dwells on possible conflicts between economic efficiency considerations on the one hand, and social and environmental, considerations on the other, the Dublin Statement stresses the need to integrate these criteria into a holistic approach and advances the view that the full cost of water should be acknowledged as part of management policies incorporating economic, social and environmental criteria.

35. Thus, under the heading of objectives, paragraph 18.8 of Agenda 21 states that

> "integrated water resources management is based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization ... In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged appropriately."

The Dublin Conference, by contrast, in paragraph 2.16 of its report, concerning planning, states that

> "A prerequisite for sustainable management of water as a scarce and vulnerable resource is that full costs should be acknowledged in all planning and development. Planning considerations should reflect benefits investment, environmental protection and operation costs, as well as the opportunity costs reflecting the most valuable alternative use of water. ... Charging mechanisms should, however, reflect as far as possible both the true cost of water when used as an economic good and the ability of the communities to pay".

An almost identical statement, however, is found in paragraph 18.16 of Agenda 21, under the heading "scientific and technological means".

36. In paragraph 4.16 the Dublin Conference report goes on to say that

> "Holistic water management means that all uses, including the conservation and sustainable use of living resources, are considered when making water-management decisions. This objective will be more likely to be achieved if values, direct and indirect, obvious and intrinsic, are calculated and the true cost of water is paid by the user. The payment of the true cost of water is likely to encourage water conservation, efficiency and reuse."

It goes on to say, however, that the ability of poor urban and rural people to pay should be considered in pricing water supplies for essential uses. Further on, in paragraph 6.20 (b), it states that the objective of resolving competing demands on water resources through the application of appropriate economic, legal and institutional mechanisms

"is achievable through: better integration of water use within the framework of overall national economic, agricultural and environmental policies and adoption of demand management strategies, ranging from appropriate pricing policies to implementation of relevant legal frameworks and entitlement supported by the widespread introduction of water saving technologies."

37. Both the Dublin Conference and the United Nations Conference on Environment and Development support the "polluter pays" principle. Thus, paragraph 18.40 (i) of Agenda 21 refers to the application of the "polluter pays" principle, where appropriate, to all kinds of sources, including on-site and off-site sanitation. The Dublin Statement, however, takes a broader stand and deals with the utilization of funds generated through pollution charges. In paragraph 4.11 (e), it states "Where possible, utilize economic instruments, including charges on water users and polluters and appropriate incentives, with the funds generated being utilized for waste-water treatment and reinforcement of environmental management activities in freshwater resources."

38. With regards to transboundary water resources, in paragraph 2.14, the Dublin Conference says that "In many cases, the integrated water resources development and management of transboundary water resources will raise the need for international co-operation and mechanisms at international or regional levels to facilitate inter-country agreement on the coordination of the management of such resources in an economically and environmentally sound manner." In the ensuing paragraph it goes on to state that "International law is needed to facilitate bilateral or regional agreements on transboundary integrated water resources development and management." Agenda 21, in paragraph 18.10, states that "In the case of transboundary water resources, there is a need for riparian States to formulate water resources strategies, prepare water resources action programmes and consider, where appropriate, the harmonization of those strategies and action programmes."

39. As far as water resources protection and conservation, the Dublin Conference report recommends in paragraph 4.5 (a) the "preparation of basin action plans, especially for priority high-risk basins, including their rivers, lakes, and aquifers, designated at the national level (and at international levels, for those basins that transcend international boundaries), to integrate land-use planning with water management and conservation, to coordinate the activities of provincial, national and international agencies, to address transboundary issues, and to initiate contingency plans to control accidental spills and to respond to natural disasters." Paragraph 4.11 (c) recommends the "promotion of national legislation and regional agreements, where necessary, for preventing and controlling transboundary water pollution". In paragraph 18.40 (h), Agenda 21 calls for the "development of national and international legal instruments that may be required to protect the quality of water resources, as appropriate, particularly for: (i) monitoring and control of pollution and its effects in national and transboundary waters; (ii) control of long-range atmospheric transport of pollutants; (iii) control of accidental and/or deliberate spills in national and/or transboundary water bodies; (iv) environmental impact assessment."

40. Both the Mar del Plata Action Plan and the relevant provisions of Agenda 21 provide basic mandates for action by the organizations of the United Nations system, including monitoring of the implementation of recommendations

contained in them. As can be seen from the events that have taken place since Mar del Plata, there is a need for an ongoing dialogue to bring about an evolution of concepts required to deal with changing circumstances. The Committee on Natural Resources may wish to engage in this dialogue with a view to clarifying issues, extending the consensus where agreement does not yet exist and generating new approaches to deal with issues emerging during the 1990s and beyond.

Notes

1/ See "Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-4 June 1992" (A/CONF.151/26, annex II).

2/ See Report of the United Nations Water Conference, Mar del Plata, 14-25 March 1977 (United Nations publication, Sales No. E.77.II.A.2), chap. I.

3/ A Strategy for Water Sector Capacity Building. Proceedings of the UNDP Symposium, Delft, 3-5 June 1992 (New York, UNDP, 1992), p. 18.

4/ Ibid.

5/ International Conference on Water and the Environment, 23-31 January 1992, Dublin (Geneva, WMO), p. 3.

6/ Ibid., p. 4.

Annex I

INVOLVEMENT OF THE ORGANIZATIONS OF THE UNITED NATIONS SYSTEM IN THE FIELD OF WATER RESOURCES

	Development and management functions	Sectors							
		Agricultural water use	Drinking water supply	Industrial water use	Hydropower	Navigation	Flood Control	Drought management	Multipurpose water use
1	Surface water hydrology	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, FAO, World Bank, IAEA	Department of Economic and Social Development, UNICEF, UNDP, UNEP, UNU, ECA, ESCAP, ESCWA, INSTRAW, World Bank, HABITAT	Department of Economic and Social Development, UNDP, UNU, ECA, World Bank, HABITAT	Department of Economic and Social Development, UNDP, UNU, ECA, INSTRAW, UNESCO, World Bank	Department of Economic and Social Development, UNDP, ECA, ESCAP, World Bank	Department of Economic and Social Development, UNDP, UNU, ECA, ESCAP, ESCWA, UNESCO, FAO, WMO, World Bank, HABITAT	Department of Economic and Social Development, UNDP, UNU, ECA, ESCAP, ESCWA, UNESCO, FAO, WMO, World Bank	Department of Economic and Social Development, UNEP, UNU, ECA, ESCAP, ESCWA, World Bank, UNESCO, WMO, HABITAT, IAEA
2	Groundwater hydrology	Department of Economic and Social Development, UNDP, UNU, ECA, FAO, World Bank, IAEA	Department of Economic and Social Development, UNDP, UNU, ECA, INSTRAW, World Bank, HABITAT	UNDP, UNU, ECA, World Bank, HABITAT			UNDP, UNU, ECA, HABITAT, UNESCO, WMO	Department of Economic and Social Development, UNDP, UNU, ECA, ESCAP, UNESCO, FAO, WMO, World Bank	Department of Economic and Social Development, UNEP, UNU, ECA, ESCAP, ESCWA, HABITAT, UNESCO, WMO, World Bank, IAEA
3	Surface water quality monitoring	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, FAO, WHO, World Bank, IAEA	Department of Economic and Social Development, UNICEF, UNDP, UNU, ECA, ESCAP, UNEP, WHO, World Bank, HABITAT	Department of Economic and Social Development, UNDP, UNEP, WHO, World Bank, HABITAT, IAEA	UNDP, ECA	UNDP, ECA, ESCAP		Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, UNESCO, FAO, WMO	Department of Economic and Social Development, UNU, ECA, ESCAP, UNEP, UNESCO, WHO, WMO, HABITAT, UNIDO, IAEA
4	Groundwater quality monitoring	UNDP, UNEP, ECA, FAO, WHO, World Bank, IAEA	UNICEF, UNDP, ECA, ESCAP, UNEP, WHO, World Bank, HABITAT	UNDP, UNEP, WHO, World Bank, HABITAT, IAEA				UNDP, UNEP, ECA, ESCAP, UNESCO, FAO, WMO	UNEP, ECA, ESCAP, UNESCO, WHO, WMO, HABITAT, IAEA
5	Information on water use	UNDP, UNEP, UNU, ECA, ECE, ECLAC, ESCAP, INSTRAW, FAO, World Bank	UNDP, UNEP, UNICEF, UNU, ECA, ECE, ECLAC, ESCAP, INSTRAW, WHO, World Bank, HABITAT	UNDP, UNEP, UNU, ECA, ECE, ECLAC, ESCAP, World Bank, HABITAT	UNDP, UNU, ECA, ECE, ECLAC, ESCAP, INSTRAW, World Bank	UNDP, UNU, ECA, ECE, ECLAC, ESCAP	UNDP, UNEP, UNU, ECA, ECE, ECLAC, ESCAP, UNESCO, WMO	UNDP, UNEP, UNU, ECA, ECLAC, ESCAP, UNESCO, WMO, FAO, World Bank	UNEP, UNU, ECA, ECE, ECLAC, ESCAP, INSTRAW, HABITAT, UNESCO, WMO, World Bank

Development and management functions	Sectors							
	Agricultural water use	Drinking water supply	Industrial water use	Hydropower	Navigation	Flood Control	Drought management	Multipurpose water use
6 Surface water development	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ESCAP, FAO, WFP, World Bank	Department of Economic and Social Development, UNDP, UNEP, UNICEF, UNU, ECA, ESCAP, WHO, WFP, World Bank, HABITAT	Department of Economic and Social Development, UNDP, UNEP, ECA, World Bank, HABITAT	Department of Economic and Social Development, UNDP, ECA, ESCAP, World Bank, UNIDO	UNDP, ECA, ESCAP, World Bank	Department of Economic and Social Development, UNDP, UNEP, ECA, ESCAP, ESCWA, UNDRO, FAO, WFP, World Bank, HABITAT, UNESCO, WMO	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ESCAP, UNESCO, WMO, FAO, WFP, World Bank	Department of Economic and Social Development, UNDP, UNEP, ECA, ECLAC, ESCAP, ESCWA, WFP, UNESCO, WMO, World Bank, HABITAT
7 Ground water development	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ESCAP, FAO, WFP, World Bank	Department of Economic and Social Development, UNDP, UNEP, UNICEF, UNU, ECA, ESCAP, WHO, WFP, World Bank, HABITAT	UNDP, UNEP, ECA, World Bank, HABITAT, UNIDO				Department of Economic and Social Development, UNDP, UNEP, ECA, ESCAP, UNESCO, WMO, FAO, WFP, World Bank	Department of Economic and Social Development, UNDP, UNEP, ECA, ESCAP, ESCWA, WFP, World Bank, HABITAT, UNESCO, WMO
8 Waste water reuse	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ECE, FAO, World Bank	Department of Economic and Social Development, UNDP, WHO	UNDP, ECA, ECE, WHO, World Bank, HABITAT				UNDP, UNEP, UNU, ESCAP	Department of Economic and Social Development, UNDP, ECA, ECE, ECLAC, ESCAP, ESCWA, HABITAT, UNESCO, WMO
9 Integrated water resources management	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ECE, ESCAP, FAO, WHO, WFP, World Bank	Department of Economic and Social Development, UNDP, UNEP, ECA, ECE, ESCAP, WHO, WFP, World Bank, HABITAT	Department of Economic and Social Development, UNDP, UNEP, ECA, ECE, ESCAP, WHO, World Bank, HABITAT	Department of Economic and Social Development, UNDP, ECA, ECE, World Bank	UNDP, ECA, ECE, ESCAP, World Bank	Department of Economic and Social Development, UNDP, UNEP, ECA, ECE, ESCAP, ESCWA, UNDRO, WFP, World Bank, HABITAT, UNESCO, WMO	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ECE, ESCAP, UNESCO, FAO, WMO, WFP, World Bank	Department of Economic and Social Development, UNDP, UNEP, ECA, ECE, ECLAC, ESCAP, ESCWA, WFP, World Bank, WMO, UNESCO, HABITAT

Development and management functions	Sectors							
	Agricultural water use	Drinking water supply	Industrial water use	Hydropower	Navigation	Flood Control	Drought management	Multipurpose water use
10 Water use management	Department of Economic and Social Development, UNDP, UNEP, UNU, FAO, ECA, ECLAC, ESCAP, World Bank	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ECLAC, ESCAP, INSTRAW, WHO, World Bank, HABITAT	Department of Economic and Social Development, UNDP, UNEP, ECA, ECLAC, ESCAP, World Bank, HABITAT, UNIDO	UNDP, ECA, ESCAP, ECLAC, INSTRAW, World Bank	UNDP, ECA, ECLAC, World Bank	UNDP, UNEP, ECA, ECLAC, ESCAP, FAO, UNESCO, WMO, World Bank	UNDP, UNEP, UNU, ECA, ECLAC, ESCAP, FAO, World Bank, UNESCO, WMO	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ECLAC, ESCAP, INSTRAW, UNESCO, WMO, World Bank, HABITAT
11 Waste water management	UNDP, UNEP, ECA, ECE, FAO, WHO, WFP	UNDP, UNEP, ECA, WHO, World Bank, HABITAT	UNDP, UNEP, ECA, ECE, WHO, World Bank, HABITAT, UNIDO					UNDP, ECA, ECE, ECLAC, ESCAP, ESCWA, WMO, HABITAT, UNESCO, UNIDO
12 Strengthening of institutions	UNDP, UNEP, UNU, ECA, ECLAC, FAO, World Bank	UNDP, UNEP, UNICEF, UNU, ECA, ESCAP, ECLAC, WHO, World Bank, HABITAT	UNDP, UNEP, UNU, ECA, ECLAC, World Bank, HABITAT	UNDP, UNU, ECA, ECLAC, World Bank	UNDP, ECA, ESCAP	UNDP, UNU, ECA, ECLAC, ESCAP, World Bank, HABITAT, UNESCO, WMO	UNDP, UNU, ECA, ECLAC, UNESCO, FAO, WMO, World Bank	UNDP, UNEP, UNU, ECA, ECLAC, ESCAP, ESCWA, World Bank, HABITAT, UNESCO, WMO
13 Legislation	Department of Economic and Social Development, UNDP, UNU, ECA, ECE, FAO	Department of Economic and Social Development, UNDP, UNU, ECA, ECE, WHO, HABITAT	Department of Economic and Social Development, UNDP, ECA, ECE	Department of Economic and Social Development, UNDP, UNU, ECA, ECE	UNDP, ECA, ECE, ESCAP	UNDP, UNU, ECA, ESCAP, UNDRO, FAO, HABITAT	UNDP, UNU, ECA, FAO	Department of Economic and Social Development, UNDP, UNEP, UNU, ECA, ECE, ECLAC, ESCAP, ESCWA, FAO, World Bank, HABITAT
14 Education and training	UNDP, UNEP, UNU, ECA, INSTRAW, FAO, WHO, WFP, World Bank	Department of Economic and Social Development, UNDP, UNEP, UNICEF, UNU, ECA, ESCAP, INSTRAW, WHO, World Bank, HABITAT	UNDP, UNEP, ECA, WHO, World Bank	UNDP, UNU, ECA, INSTRAW, UNESCO, World Bank	Department of Economic and Social Development, UNDP, ECA, ESCAP	UNDP, ECA, ESCAP, UNDRO, WFP, UNESCO, WMO, World Bank, HABITAT	UNDP, UNU, ECA, ESCAP, FAO, WFP, UNESCO, WMO, World Bank	UNDP, UNEP, UNU, ECA, ECLAC, ESCAP, INSTRAW, UNESCO, WMO, World Bank, HABITAT

	Development and management functions	Sectors							
		Agricultural water use	Drinking water supply	Industrial water use	Hydropower	Navigation	Flood Control	Drought management	Multipurpose water use
15	Human resources development	UNDP, UNEP, UNU, ECA, INSTRAW, FAO, WHO, World Bank	Department of Economic and Social Development, UNDP, UNEP, UNICEF, ECA, ESCAP, INSTRAW, WHO, World Bank, HABITAT	UNDP, UNU, ECA, World Bank, HABITAT	UNDP, UNU, ECA, World Bank	UNDP, ECA, ESCAP	UNDP, ECA, ESCAP, UNDRO, World Bank, HABITAT, UNESCO, WMO	Department of Economic and Social Development, UNDP, UNU, ECA, ESCAP, UNESCO, FAO, WMO, World Bank	UNDP, UNEP, UNU, ECA, ESCAP, INSTRAW, World Bank, HABITAT, UNESCO, WMO

Annex II

OTHER ARRANGEMENTS FOR SYSTEM-WIDE COORDINATION

Name	Scope	Organizations involved	Terms of agreement
Working Agreement in the Field of Hydrology and the Long-term Cooperation between the Secretariats of UNESCO and WMO	Long-term cooperation in the field of hydrology	UNESCO and WMO	1. Maintain and develop collaboration throughout the field of hydrology 2. Establish close cooperation with their respective hydrology programmes (OHP of WMO and IHP of UNESCO)
FAO/WMO Working Agreement in the Field of Hydrology and Water Resources	Hydrology and its application to agriculture	FAO and WMO	General division of responsibilities between the two organizations for the collection and analysis hydrological and meteorological data
WHO/FAO/UNEP Memorandum of Understanding Concerning Water-borne Diseases in Agricultural Water Development	Establishes procedures for collaboration and joint action for the prevention and control of vector-borne diseases	FAO, WHO, UNEP. It also provides for cooperation with other organizations	1. Hold meetings to examine programme activities and identify measures 2. Exchange of information, project data, country briefs, (profiles) 3. Prepare guidelines and training
FAO/WHO Memorandum of Understanding concerning Rural Water Supply and Agricultural Development	Training of rural extension workers and integration of rural water supply and sanitation in rural development programmes	FAO and WHO, with provision for cooperation with other organizations	1. Joint planning and implementation of projects involving domestic water supply and irrigation in rural areas 2. Undertake studies and training on the application of appropriate technology and benefits from rural water supply and sanitation
FAO/UNESCO Intersecretariat arrangement in Hydrology and Water Resources	Programmes related to hydrology and water resources development	FAO, UNESCO	1. Regular consultations to harmonize planning of programmes of work in common areas 2. Exchange of advice and information in hydrology and water resources
UNIDO/UNEP Joint Committee	Coordination of work relating to industrial use of water and environmental aspects of industrial development	UNIDO, UNEP	The Committee meets annually to coordinate activities
ECA's Interagency Group for Water Resources Activities	Entire field of water resources	ECA, organizations of the United Nations system, African Development Bank, river basin organizations	Interorganizational cooperation at the regional level

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Name	Scope	Organizations involved	Terms of agreement
Designated Official for Environmental Matters (DOEM)	Coordination of system-wide activities in the field of environment, including those related to water resources development	All organizations concerned	DOEMs meet to promote interorganizational cooperation
FAO/World Food Programme	Supply food for projects promoting social and economic development, including irrigation	FAO and World Food Programme	Mobilize and distribute supplies and food for human resources development in child-feeding and school lunch programmes; infrastructure
World Bank/FAO Cooperative Programme	Project identification and preparation for investment in agriculture	World Bank and FAO	Combining of staff resources and experience in the identification and preparation of investment projects for World Bank financing; FAO's contribution is made through its investment centre
World Bank/UNESCO Cooperative Programme	Project identification for investment in the education sector	World Bank and UNESCO	Joint undertaking of evaluation and project preparation in the field of education
World Bank/WHO Working Agreement in Water Supply and Sanitation	Pre-investment activities relative to water supply, waste disposal and storm drainage	WHO and World Bank	Joint undertaking of pre-investment studies and missions to developing countries of common membership
World Bank/UNIDO	Project identification and preparation of labour-intensive small-scale industries	World Bank and UNIDO	Joint studies and missions to evaluate and prepare projects, with special emphasis on support of employment-intensive, small-scale manufacturing and construction industries, including small-scale hydropower plants
World Bank/IFAD Working Agreement	Preparation and appraisal of agricultural and rural development projects	World Bank and IFAD	Assistance by the World Bank in the preparation, appraisal, evaluation and supervision of projects for financing by IFAD or for cofinancing by IFAD and the World Bank

Annex III

MEETINGS, SEMINARS, SYMPOSIA AND CONFERENCES HELD DURING 1990-1992

Organization	Title, dates, venues
	1990
ECE	Seminar on Wastewater Management, 21-25 May 1990, Munich, Germany.
UNESCO	International Symposium on Water Systems Analysis, 12-15 June 1990, Winnipeg, Canada.
WMO	WMO Commission on Health and Environment, 19-21 June 1990, Geneva, Switzerland.
UNESCO	International Conference on Calibration and Reliability in Groundwater Modelling, 3-6 September 1990, The Hague, Netherlands.
UNEP	4th International Conference on the Conservation and Management of Lakes, 5-9 September 1990, Hangzou, China.
UNDP, United Nations system	Global Consultation on Safe Water and Sanitation for the 1990s, 8-9 September 1990, New Delhi, India.
Department of Technical Cooperation for Development of the United Nations Secretariat	Interregional Seminar on the Mobilization of Resources for Optimal Water Development Allocation and Conservation, 3-7 December 1990, Merida, Mexico.
	1991
ESCAP	Eighteenth session of the Panel on Tropical Cyclones, 29 January-4 February 1991, Male, Maldives.
ESCAP, UNDRO	Regional Symposium on the International Decade for Natural Disaster Reduction, 11-15 February 1991, Bangkok, Thailand.
ECE	Work Session on Water Use and Discharge Statistics, 14-16 February 1991, Geneva, Switzerland.
UNESCO	2nd International Conference on Computer Methods and Water Resources, 18-22 February 1991, Marrakech, Morocco.
UNESCO	Southern Africa FRIEND - 1st Coordinating Meeting, 20-22 February 1991, Harare, Zimbabwe.
WHO	Meeting of the Operational and Maintenance Advisory Committee, 26 February-1 March 1991, Geneva, Switzerland.
UNESCO, IAEA	Symposium on the Use of Nuclear Techniques in Water Resources Development, 11-15 March 1991, Vienna, Austria.
IAEA	International Symposium on Isotope Techniques in Water Resources Assessment, 11-15 March 1991, Vienna, Austria.
WHO	WHO Commission on Health and Environment - 2nd meeting, 18-22 March 1991, Geneva, Switzerland.
UNICEF, WHO	UNICEF/WHO Pre-Test Workshop, 2-5 April 1991, Geneva, Switzerland.
ECE	2nd Consultation of the Government Rapporteurs on the Protection of Inland Waters Against Eutrophication, 15-17 April 1991, Geneva, Switzerland

Organization	Title, dates, venues
UNESCO	International Symposium on Hydrology and Water Resources Education and Training, 15-19 April 1991, Chihuahua, Mexico.
Department of Technical Cooperation for Development	Workshop on Aquifer Overexploitation in Developing Countries, 20-24 April 1991, Canary Islands, Spain.
WHO	2nd Consultation of the WHO Working Group on Water, Sanitation and Health, 9-11 April 1991, Geneva, Switzerland.
UNESCO	Seminar on Aquifer Vulnerability Mapping, 22-26 April 1991, Tampa, Florida, United States.
ECE	Fourth special session of the Working Party on Water Problems, 29 April-3 May 1991, Geneva, Switzerland.
ESCAP	Workshop on Forecasting, Preparedness and Other Operational Measures for Water-related Natural Disaster Reduction, 29 April-3 May 1991, Bangkok, Thailand.
UNESCO	4th International Symposium on Land Subsidence, 12-18 May 1991, Houston, Texas, United States.
UNESCO	Subregional Symposium on Efficient Water Uses and Conservation for Survival, 27-29 May 1991, Tunis, Tunisia.
ECE	Seminar on Ecosystems Approach to Water Management, 27-31 May 1991, Oslo, Norway.
UNDP, United Nations system	International Symposium on Capacity-building for Water Resources Utilization, 3-5 June 1991, Delft, Netherlands.
ECE	2nd Consultation of the Government Rapporteurs on Water Quality Objectives and Criteria, 4-6 June 1991, Geneva, Switzerland.
ECE	1st Meeting of the Task Force on the Prevention and Control of Water Pollution from Fertilizers and Pesticides, 13-15 June 1991, Berlin, Germany.
WHO	Revision of the WHO Guidelines for Drinking-Water Quality. Review Meeting on Pathogenic Agents and volume III on Surveillance of Community Supplies, 24-28 June 1991, Harare, Zimbabwe.
UNEP	Support Research and Training in the Assessment of the Water-Climate System in the Amazon Basin under the Impact of Large-scale Land Use Changes, August 1991, Manaus, Brazil.
WMO	Water Quality Workshop, 26-30 August 1991, Bratslava, Czechoslovakia.
UNESCO	Management of Information in Science and Technology, 2 September-29 November 1991, Brussels, Belgium.
Department of Technical Cooperation for Development, INSTRAW	Workshop on Testing Training Modules on Women, Water Supply and Sanitation, 2-6 September 1991, Banjul, Gambia.
WHO	2nd Consultation of the FAO/WHO Working Group on Legal Aspects of Water Resources, Water Supply and Wastewater Management, 10-12 September 1991, Geneva, Switzerland.
WHO	1st Interregional Workshop on the Promotion of Environmental Management for Vector Control through Agriculture Extension Programmes, 23-26 September 1991, Alexandria, Egypt.

Organization	Title, dates, venues
UNESCO, WMO, ECA	Technical Conference on Hydrological Services in Africa, 30 September-4 October 1991, Addis Ababa, Ethiopia.
Department of Technical Cooperation for Development	International Seminar on Environmental Aspects of Water Resources Development, 7-16 October 1991, Assenovgrad, Soviet Union.
ECE	Fifth special session of the Working Party on Water Problems, 14-17 October 1991, Geneva, Switzerland.
ECE	Special session of the Working Party on Water Problems to Elaborate the Draft Convention on the Protection and Use of Transboundary Water Pollution from Fertilizers and Pesticides, 13-15 October 1991, Berlin, Germany.
WHO	11th meeting of the Joint WHO/FAO/UNEP/UNCHS Panel of Experts on Environmental Management for Vector Control (PEEM), 21-25 October 1991, Kuala Lumpur, Malaysia.
WHO	2nd Interregional Workshop on the Promotion of Environmental Management for Disease Control through Agricultural Extension Programmes, 28-31 October 1991, Bangkok, Thailand.
ESCAP	Workshop on Sustainable and Environmentally Sound Development of Water Resources, 28 October-1 November 1991, Bangkok, Thailand.
ECLAC	Seminar/Workshop on Model Programmes for Integral Water Resources Management in Central America, Panama and the Dominican Republic, 4-6 December 1991, San Jose, Costa Rica.
UNESCO	3rd International Seminar on Information Related to Water and the Environment, 14-15 November 1991, Brussels, Belgium.
ECE	Meeting on Statistics of Water Quality, 9-12 December 1991, Geneva, Switzerland.
UNESCO	International Symposium on Water System Analysis, Canada.
UNESCO	Regional Seminar on Mapping Groundwater Resources and their Vulnerability, Paris, France.
UNESCO, IAEA	Application of Nuclear Techniques in Hydrology, Vienna, Austria.
UNESCO	Symposium/Workshop on the Role of Vegetation in the Hydrological Cycle, Paris, France.
	1992
United Nations system	International Conference on Water and the Environment, 26-31 January 1992, Dublin, Ireland.
ESCAP, WMO	1st joint session of the Typhoon Committee and the Panel on Tropical Cyclones, 18-27 February 1992, Pataya, Thailand.
ECE	Fifth session of the Senior Advisers to ECE Governments on Environmental Water Problems, 2-6 March 1992, Geneva, Switzerland.
ECE	Fifth resumed session of the Senior Advisers to ECE Governments on Environmental and Water Problems, 17-18 March 1992, Helsinki, Finland.
WMO	2nd planning meeting on GRID Estimation Runoff Data, 6-9 April 1992, Warsaw, Poland.
WHO	GEMS/Water Workshop on Water Quality Monitoring and Assessment, 23 March-3 April 1992, Arusha, United Republic of Tanzania.

Organization	Title, dates, venues
WHO	GEMS/Water Expert Review Meeting of the Raison/GEMS Data System, 11-15 May 1992, Burlington, Canada.
UNESCO	5th International Symposium on River Sedimentation, 6-10 April 1992, Karlsruhe, Germany.
WHO	3rd Interregional Workshop on the Promotion of Environmental Management for Disease Vector Control Through Agricultural Extension Programmes, 20-23 April 1992, San Jose, Costa Rica.
UNESCO	Seminar on Mathematical Modelling of Alluvial Rivers, 14-18 April 1992, Kathmandu, Nepal.
UNESCO	IAH and International Hydrology in the 1990s and Beyond, 30 April-1 May 1992, Prague, Czechoslovakia.
UNESCO	International Symposium on Transboundary River Basin Management and Sustainable Development, 18-22 May 1992, Delft, Netherlands.
WHO	Review of Training Package on Operation and Maintenance of Rural Water Supply and Sanitation Facilities, 1-3 June 1992, Geneva, Switzerland.
WHO	Advisory Committee of the Operation and Maintenance Working Group, 4-5 June 1992, Geneva, Switzerland.
WHO	Third Consultation of the WHO Working Group on Water Sanitation and Health.
ECE	Consultation of Governmentally Designed Experts on Ecosystems-based Water Management, 1-5 June 1992, Oslo, Norway.
United Nations system	United Nations Conference on Environment and Development, 3-14 June 1992, Rio de Janeiro, Brazil.
WMO	Workshop on Global Runoff Data Centre, 15-17 June 1992, Koblenz, Germany.
ECE	3rd meeting of the Task Force on the Prevention and Control of Pollution from Fertilizers and Pesticides, 16-18 June 1992, Berlin, Germany.
Department of Economic and Social Development, UNDP, UNDRO	International Workshop on Flood Mitigation, Emergency Preparedness and Flood Disaster Management in Viet Nam, 22-24 July 1992, Hanoi, Viet Nam.
UNESCO	Workshop on Advances in Distributed Hydrological Models, 25-26 June 1992, Bergamo, Italy.
WHO	15th meeting of the PEEM Steering Committee, June 1992, Manila, Philippines.
UNESCO, IAHS	UNESCO/IAHS Scientific Colloquium on Space-Time Scale Variability and Interdependence for Various Hydrological Processes, 3-4 July 1992, Paris, France.
UNESCO	Tenth session of the Intergovernmental Council of the IHP, 6-11 July 1992, Paris, France.
UNESCO	Meeting on Biodiversity and Land/Inland Water Ecotones, 23-30 August 1992, Barcelona, Spain.
UNESCO	Meeting of Sub-Network on Fish and Land/Inland Ecotones, 31 August-4 September 1992, Paris, France.
WHO	PEEM Collaborating Centre Meeting, join PEEM/DBL/BRI Training Course on Health Opportunities in Water Resources Development, 31 August-4 September 1992, Harare, Zimbabwe.
UNESCO	Workshop on Hydrological Impact of Nuclear Power Plant Systems, 23-25 September 1992, Paris, France.
UNESCO	International Workshop on Biodegradation of Toxic Contaminants in Groundwater, September 1992, Canada.

Organization	Title, dates, venues
Department of Economic and Social Development	United Nations Interregional Workshop on the Role of Women in Environmentally Sound and Sustainable Development, 9-15 September 1992, Beijing, China.
WHO	Third Consultation of the FAO/WHO Working Group on Legal Aspects of Water Resources, Water Supply and Wastewater Management, 14-16 September 1992, Rome, Italy.
IAEA	Consultant Meeting on the Application of Isotopes in Arid Zones, 14-17 September 1992, Vienna, Austria.
ESCAP	Workshop on Testing Modules on Women, Water Supply and Sanitation, 21-25 September 1992, Bangkok, Thailand.
UNESCO	International Workshop on Biodegradation of Toxic Contaminants in Groundwater, September 1992, Canada.
UNESCO	International Symposium on Snow and Glacier Hydrology, 16-21 November 1992, Kathmandu, Nepal.
WHO	Ninth session of the Commission on Hydrology, 12-24 October 1992, Jamaica.
WHO	International Workshop on the Role of Communities in the Management of Improved Water Supply Systems, 4-10 November 1992, The Hague, Netherlands.
WHO	Workshop on WCP-Water Project A.2, 9-13 November 1992, Geneva, Switzerland.
Department of Economic and Social Development, UNDP, UNEP	Consultative Forum on Social, Economic and Environmental Impacts of Water Management, 11-13 November 1992, Geneva, Switzerland.
ECLAC/German Agency for Technical Cooperation	Curso de Postgrado en Gestion Integral se los Recursos Hidricos, 28 September-23 October 1992, Mendoza, Argentina.

UNITED
NATIONS

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Economic and Social Council

Distr.
GENERAL

E/C.7/1993/5
17 February 1993

ORIGINAL: ENGLISH

COMMITTEE ON NATURAL RESOURCES
First session
29 March-8 April 1993
Item 7 of the provisional agenda*

MATTERS ARISING FROM THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT IN THE FIELD OF WATER RESOURCES

Provisions of Agenda 21 relevant to the area of freshwater resources

Report of the Secretary-General

SUMMARY

The effective implementation of the provisions of Agenda 21 will be one of the most important tasks facing the United Nations system in the years to come. The main objectives, recommendations, proposed activities and targets adopted by the United Nations Conference on Environment and Development, held in Rio de Janeiro from 3 to 14 June 1992, provide the basic guidelines for the integration of action by the United Nations system with regard to environment and development, and with a view to achieving the ultimate goal of sustainable development.

In this context, the challenge of securing a reliable supply of freshwater, adequate in quantity and quality, for all people, is perhaps the most fundamental issue related to both environment and development. However, although one of the forty chapters of Agenda 21 deals with the protection of the quality and supply of freshwater resources, the vital issue of freshwater resources, unlike that of biological conservation, of climate change and of forest conservation, was not fully addressed by the Conference.

Water is a basic and essential component of life on this planet. The availability and quality of freshwater are of critical importance for both natural and human environments. Scarcity and misuse of freshwater pose a

* E/C.7/1993/1.

serious and growing threat to sustainable development and protection of the environment. The factors of human health, welfare, food security, industrial development, economic prosperity of human settlements and geopolitical stability, and the ecosystem on which those factors depend, are all at risk, unless water and land resources are managed, in the present decade and beyond, more effectively than they have been in the past.

As there is hardly any current issue that demonstrates more conclusively than freshwater resources the integrated nature of environment and development, the present report summarizes, by means of tables, the provisions of various chapters of Agenda 21 that are relevant to the area of freshwater resources, in order to provide a convenient reference list of those provisions in relation to the various programme areas.

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INTRODUCTION

1. The present summary of the provisions of Agenda 21 1/ that are relevant to the area of water resources is divided into three parts: main objectives, proposed activities, and targets and financing. Instead of merely reproducing the innumerable water-related references of Agenda 21, it attempts to identify the main objectives, activities and targets specified in different programme areas of chapter 18, as well as the proposed water-related activities presented in other chapters, with a view to highlighting the areas of implementation that are common to different programme areas and call for interprogramme cooperation and collaboration.

2. Although the summary is based primarily upon chapter 18 of Agenda 21, entitled "Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources", it also draws upon complementary information from other chapters that are related to the subject of water resources, particularly those on protecting and promoting human health (chapter 6), promoting sustainable human settlement development (chapter 7), managing fragile ecosystems: combating desertification and drought (chapter 12), protection of the oceans, all kinds of seas and coastal areas (chapter 17) and environmentally sound management of solid wastes and sewage-related issues (chapter 21).

I. SUMMARY OF RELEVANT PROVISIONS OF AGENDA 21

A. Main objectives

3. Table 1 shows that there are five main objectives set forth in the introduction to chapter 18 of Agenda 21: (a) protection of water quality, (b) promotion of innovative technologies, (c) integrated water resources planning and management, (d) rational utilization of water resources and (e) promotion of international cooperation with regard to transboundary water resources.

4. As indicated in table 2, the six main objectives set forth in programme area A (Integrated water resources development and management) of chapter 18 of Agenda 21 are (a) promotion of integrated water resources management, (b) strengthening of interaction between national and local levels of water resources planning and management, (c) support for public participation in water resources planning and management, (d) capacity-building, (e) promotion of basic needs and cost recovery, and (f) promotion of international cooperation with regard to transboundary water resources.

5. As shown in table 3, it is possible to identify nine main objectives set forth in complementary programme areas B and G (Water resources assessment and Impacts of climate change on water resources, respectively) of chapter 18 of Agenda 21: (a) promotion of quantity and quality water resources assessments,

Table 1. Main objectives set forth in the introduction to chapter 18 of Agenda 21

Objective	Relevant citation
Protection of water quality	"The general objective is to make certain that adequate supplies of water of good quality are maintained for the entire population of this planet, while preserving the hydrological, biological and chemical functions of ecosystems, adapting human activities within the capacity limits of nature and combating vectors of water-related diseases" (para. 18.2)
Promotion of innovative technologies	"Innovative technologies, including the improvement of indigenous technologies, are needed to fully utilize limited water resources and to safeguard those resources against pollution" (para. 18.2)
Integrated water resources planning and management	"The widespread scarcity, gradual destruction and aggravated pollution of freshwater resources in many world regions, along with the progressive encroachment of incompatible activities, demand integrated water resources planning and management. Such integration must cover all types of interrelated freshwater bodies, including both surface water and groundwater, and duly consider water quantity and quality aspects. The multisectoral nature of water resources development in the context of socio-economic development must be recognized, as well as the multi-interest utilization of water resources for water-supply and sanitation, agriculture, industry, urban development, hydropower generation, inland fisheries, transportation, recreation, low and flat lands management and other activities" (para. 18.3)
Rational utilization of water resources	"Rational water utilization schemes for the development of surface and underground water-supply sources and other potential sources have to be supported by concurrent water conservation and wastage minimization measures" (para. 18.3)
International cooperation with regard to transboundary water resources	"Transboundary water resources and their use are of great importance to riparian States. In this connection, cooperation among those States may be desirable in conformity with existing agreements and/or other relevant arrangements, taking into account the interests of all riparian States concerned" (para. 18.4)

Table 2. Main objectives set forth under programme area A of Chapter 18 of Agenda 21

Objective	Relevant citation
Integrated water resources management	"Promote a dynamic, interactive, iterative and multisectoral approach to water resources management, including the identification and protection of potential sources of freshwater supply, that integrates technological, socio-economic, environmental and human health considerations" (para. 18.9 (a))
Interaction of national with local levels	"To plan for the sustainable and rational utilization, protection, conservation and management of water resources based on community needs and priorities within the framework of national economic development policy" (para. 18.9 (b))
Public participation in water management	"To design, implement and evaluate projects and programmes that are both economically efficient and socially appropriate within clearly defined strategies, based on an approach of full public participation, including that of women, youth, indigenous people and local communities in water management policy-making and decision-making" (para. 18.9 (c))
Capacity-building	"To identify and strengthen or develop, as required, in particular in developing countries, the appropriate institutional, legal and financial mechanisms to ensure that water policy and its implementation are a catalyst for sustainable social progress and economic growth" (para. 18.9 (d))
Promotion of basic needs and cost recovery	"In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged appropriately" (para. 18.8)
International cooperation with regard to transboundary water resources	"In the case of transboundary water resources, there is a need for riparian States to formulate water resources strategies, prepare water resources action programmes and consider, where appropriate, the harmonization of those strategies and action programmes" (para. 18.10)

Table 3. Main objectives set forth under complementary programme areas B and G of chapter 18 of Agenda 21

Objective	Relevant citation
Promotion of overall assessment of quantity and quality of water resources	"Ensuring the assessment and forecasting of the quantity and quality of water resources, in order to estimate the total quantity of water resources available and their future supply potential, to determine their current quality status, to predict possible conflicts between supply and demand and to provide a scientific database for rational water resources utilization" (para. 18.24)
Dissemination of water resources assessment technology	"To make available to all countries water resources assessment technology that is appropriate to their needs, irrespective of their level of development, including methods for the impact assessment of climate change on freshwaters" (para. 18.25 (a))
Adequate allocation of funds to water resources assessment	"To have all countries, according to their financial means, allocate to water resources assessment financial resources in line with the economic and social needs for water resources data" (para. 18.25 (b))
Full use of water resources assessment data in water policy	"To ensure that the assessment information is fully utilized in the development of water management policies" (para. 18.25 (c))
International cooperation with regard to transboundary water resources	"To have all countries establish the institutional arrangements needed to ensure the efficient collection, processing, storage, retrieval and dissemination to users of information about the quality and quantity of available water resources at the level of catchments and groundwater aquifers in an integrated manner" (para. 18.25 (d))
Human resources development	"To have sufficient numbers of appropriately qualified and capable staff recruited and retained by water resources assessment agencies and provided with the training and retraining they will need to carry out their responsibilities successfully" (para. 18.25 (e))
Assessment of potential impact of climate change	"To understand and quantify the threat of the impact of climate change on freshwater resources" (para. 18.84 (a))
Implementation of countermeasures to offset impacts of climate change	"To facilitate the implementation of effective national countermeasures, as and when the threatening impact is seen as sufficiently confirmed to justify such action" (para. 18.84 (b))
Study of climate change, droughts and floods	"To study the potential impacts of climate change on areas prone to droughts and floods" (para. 18.84 (c))

(b) dissemination of water resources assessment technology, (c) provision of adequate funds for water resources assessments, (d) full utilization of water resources assessment data in water development planning and policy, (e) promotion of international cooperation with regard to transboundary water resources, (f) human resources development, (g) incentive to assessments of potential impacts of climate change on freshwater resources, (h) implementation of countermeasures to offset, and (i) support for studies on, those impacts.

6. Table 4 demonstrates that there are eight main objectives set forth in programme area C (Protection of water resources, water quality and aquatic ecosystems) of chapter 18 of Agenda 21: (a) promotion of integrated water resources management, (b) identification and protection of potential sources of freshwater supply, (c) protection of groundwater, (d) promotion of water pollution prevention and control, (e) protection of aquatic ecosystems, (f) control of water-borne diseases, (g) human resources development, and (h) strengthening of international monitoring systems.

7. As shown in table 5, it is possible to identify eight main objectives set forth in complementary programme areas D and E (Drinking-water supply and sanitation and Water and sustainable urban development, respectively) of chapter 18 of Agenda 21: (a) protection of health and the environment, (b) promotion of institutional reform within an integrated approach to water resources development and management, (c) promotion of community management, (d) promotion of appropriate technologies, (e) integration of urban water-supply with national development policy, (f) extension of urban drinking-water supply and sanitation, (g) establishment of urban discharge standards, and (h) improvement in the collection, recycling and disposal of solid waste.

8. As table 6 indicates, it is possible to identify nine main objeccives set forth in complementary programme areas D and F (Drinking-water supply and sanitation and Water for sustainable food production and rural development, respectively) of chapter 18 of Agenda 21: (a) protection of health and the environment, (b) promotion of institutional reform within an integrated approach to water resources development and management, (c) promotion of community management, (d) promotion of appropriate technologies, (e) recognition of the economic and social value of water resources, (f) promotion of rational water use and environmental impact assessments, (g) promotion of integrated water resources management, (h) extension of rural drinking-water supply and sanitation, and (i) sustainable management of inland fisheries and livestock.

Table 4. Main objectives set forth under programme area C of chapter 18 of Agenda 21

Objective	Relevant citation
Integrated water resources management	"Long-term development of global freshwater requires holistic management of resources and a recognition of the interconnectedness of the elements related to freshwater and freshwater quality" including "the intrinsic linkage between water resource development projects and their significant physical, chemical, biological, health and socio-economic repercussions". Similarly, "erosion, sedimentation, deforestation and desertification have led to increased land degradation, and the creation of reservoirs has, in some cases, resulted in adverse effects on ecosystems" (paras. 18.35 and 18.36)
Identification and protection of potential sources of freshwater supply	"To identify all potential sources of water-supply and prepared outlines for their protection, conservation and rational use" (para. 18.39 (b))
Protection of groundwater	"The extent and severity of contamination of unsaturated zones and aquifers have long been underestimated owing to the relative inaccessibility of aquifers and the lack of reliable information on aquifer systems. The protection of groundwater is therefore an essential element of water resource management" (para. 18.37)
Water pollution prevention and control	"To initiate effective water pollution prevention and control programmes, based on an appropriate mixture of pollution reduction-at-source strategies, environmental impact assessments and enforceable standards for major point-source discharges and high-risk non-point sources, commensurate with their socio-economic development" (para. 18.39 (c))
Protection of aquatic ecosystems	"Maintenance of ecosystem integrity, according to a management principle of preserving aquatic ecosystems, including living resources, and of effectively protecting them from any form of degradation on a drainage basin basis" (para. 18.38 (a))
Control of water-borne diseases	"Public health protection, a task requiring not only the provision of safe drinking-water but also the control of disease vectors in the aquatic environment" (para. 18.38 (b))
Human resources development	"Human resources development, a key to capacity-building and a prerequisite for implementing water-quality management" (para. 18.38 (c))
Promotion of international monitoring systems	"To participate, as far as appropriate, in international water-quality monitoring and management programmes such as the Global Water Quality Monitoring Programme (GEMS/WATER), the United Nations Environment Programme (UNEP) Environmentally Sound Management of Inland Waters (EMINWA), the FAO regional inland fishery bodies, and the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)" (para. 18.39 (d))

Table 5. Main objectives set forth under complementary programme areas D and E of chapter 18 of Agenda 21

Objective	Relevant citation
Protection of health and the environment	"Protection of the environment and safeguarding of health through the integrated management of water resources and liquid and solid wastes" (para. 18.48 (a))
Institutional reform and integrated development	"Institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behaviour" (para. 18.48 (b))
Community management	"Community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes" and "the full participation of women at all levels in sector institutions" (para. 18.48 (b) and (c))
Promotion of efficient management and appropriate technologies	"Sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies" (para. 18.48 (d))
Promotion of national development and urban water-supply	"Support local and central Governments' efforts and capacities to sustain national development and productivity through environmentally sound management of water resources for urban use" (para. 18.57)
Greater provision of urban water-supply and sanitation	"To have ensured that all urban residents have access to at least 40 litres per capita per day of safe water and that 75 per cent of the urban population are provided with on-site or community facilities for sanitation" (para. 18.58 (a))
Establishment of discharge standards for municipal and industrial effluents	"To have established and applied quantitative and qualitative discharge standards for municipal and industrial effluents" (para. 18.58 (b))
Better collection, recycling and disposal of solid waste	"To have ensured that 75 per cent of solid waste generated in urban areas are collected and recycled or disposed of in an environmentally safe way" (para. 18.58 (c))

Table 6. Main objectives set forth under complementary programme areas D and F of chapter 18 of Agenda 21

Objective	Relevant citation
Protection of health and the environment	"Protection of the environment and safeguarding of health through the integrated management of water resources and liquid and solid wastes" (para. 18.48 (a))
Institutional reform and integrated development	"Institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behaviour" (para. 18.48 (b))
Community management	"Local communities must participate in all phases of water management, ensuring the full involvement of women in view of their crucial role in the practical day-to-day supply, management and use of water" (para. 18.68 (b))
Promotion of efficient management and appropriate technologies	"Sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies" (para. 18.48 (d))
Recognition of economic and social value of water	"Water should be regarded as a finite resource having an economic value with significant social and economic implications reflecting the importance of meeting basic needs" (para. 18.68 (a))
Promotion of rational use and environmental impact assessment	"New irrigation schemes should be accompanied by an environmental impact assessment, depending upon the scale of the scheme, in case significant negative environmental impacts are expected. When considering proposals for new irrigation schemes, consideration should also be given to a more rational exploitation, and an increase in the efficiency or productivity, of any existing schemes capable of serving the same localities" (para. 18.72)
Integrated water resources management	"Water resource management must be developed within a comprehensive set of policies for (i) human health; (ii) food production, preservation and distribution; (iii) disaster mitigation plans; (iv) environmental protection and conservation of the natural resource base" (para. 18.68 (c))
Greater provision of rural water-supply and sanitation	"It should be ensured that rural communities of all countries, according to their capacities and available resources and taking advantage of international cooperation as appropriate, will have access to safe water in sufficient quantities and adequate sanitation to meet their health needs and maintain the essential qualities of their local environments" (para. 18.73)
Sustainable management of inland fisheries and livestock	"The objectives with regard to water management for inland fisheries and aquaculture include conservation of water-quality and water-quantity requirements for optimum production and prevention of water pollution by aquacultural activities" and "the promotion of sustainable management of capture fisheries as well as the development of environmentally sound approaches to intensification of aquaculture". "The objectives with regard to water management for livestock supply are twofold: provision of adequate amounts of drinking-water and safeguarding of drinking-water quality in accordance with the specific needs of different animal species" (paras. 18.74 and 18.75)

B. Proposed activities

9. The 184 proposed activities specified in the seven programme areas of chapter 18 of Agenda 21 can be classified within 30 broad groups. As table 7 shows, most of those broad groups encompass four or more programme areas, and are thus open to interprogrammatic coordination. As table 8 also shows, mention of many of these broad groups of activities can be found in other chapters of Agenda 21.

10. The proposed activities put forward in programme area A (Integrated water resources development and management) of chapter 18 of Agenda 21 can be classified within the following broad groups: (a) promotion of inventory of freshwater resources, (b) protection of potential sources of freshwater supply, (c) development of new sources of water-supply, (d) promotion of research and development, (e) promotion of application and transfer of technology, (f) strengthening of the role of modern information management, (g) promotion of data dissemination and public information, (h) integration of surface and underground water management, (i) integration of land and water uses, (j) integration of water quantity and quality management, (k) promotion of optimum allocation and efficient use of water, (l) promotion of environmental impact assessments, (m) strengthening of drought prevention and management, (n) strengthening of flood prevention and management, (o) promotion of environmentally and socially benign hydropower, (p) promotion of private sector involvement, (q) promotion of public participation in development and management, (r) human resources development, (s) strengthening of institutional and legal mechanisms, (t) promotion of monitoring, evaluation and assessment of progress in implementation, (u) strengthening of local water resources management, (v) strengthening of national water resources management, (w) strengthening of water resources management at the basin (national or international) level, and (x) promotion of global coordination and international cooperation.

11. The proposed activities put forward in programme area B (Water resources assessment) of chapter 18 of Agenda 21 can be classified within the following broad groups: (a) promotion of inventories of freshwater resources, (b) promotion of research and development, (c) promotion of application and transfer of technology, (d) strengthening of the role of modern information management, (e) promotion of data dissemination and public information, (f) integration of surface and underground water management, (g) integration of land and water uses, (h) integration of water quantity and quality management, (i) protection of aquatic ecosystems, (j) promotion of environmental impact assessments, (k) strengthening of drought prevention and management, (l) strengthening of flood prevention and management, (m) promotion of public participation in development and management, (n) human resources development, (o) strengthening of institutional and legal mechanisms, (p) strengthening of local water resources management, (q) strengthening of national water resources management, (r) strengthening of water resources management at the basin (national or international) level, and (s) promotion of global coordination and international cooperation.

Table 7. Main proposed activities set forth under programme areas of chapter 18 of Agenda 21
(Relevant paragraph)

Broad group of proposed activities	Programme area						
	A	B	C	D	E	F	G
Promotion of inventory of water resources	18.12 (b)	18.24 18.27 (a) (iv) 18.30	18.40 (a) (ii)			18.78	
Protection of potential sources of water-supply	18.12 (b)		18.40 (a)	18.50 (a) (i)	18.59 (a)	18.76 (g) (iii)	18.85 (e)
Development of new sources of water-supply	18.12 (j) 18.14		18.40 (b) (iv) 18.40 (b) (viii)	18.50 (a) (iii) 18.50 (a) (v) 18.50 (b) (viii)	18.59 (a) (iii)		
Promotion of research and development	18.12 (i) 18.14	18.27 (d) 18.29	18.40 (c) 18.43 18.44	18.50 (c) (x)	18.59 (a) (vi) 18.61	18.76 (b) (ii) 18.78	18.85 18.87 18.88
Application and transfer of technology	18.12 (i) 18.14 18.20 (f)	18.25 (a) 18.30	18.42 18.43		18.61	18.79 18.81 (f)	
Strengthening of information management	18.12 (c) 18.14 18.20 (f)	18.25 (d) 18.27 (b)	18.40 (g) (ii) 18.44	18.50 (d) (i) 18.50 (d) (ii)		18.76 (h) (v)	
Data dissemination and public information	18.12 (g) 18.12 (p) 18.20 (a)	18.27 (c)		18.50 (b) (v) 18.50 (d) (ii)	18.59 (d) 18.61	18.76 (a) (vii) 18.76 (d) (vii) 18.78	
Integration of surface and ground water management	18.12 (k)	18.27 (b) (ii)	18.40 (d) (iii) 18.40 (d) (iv)			18.76 (c) (iii)	18.85 (e)
Integration of land and water uses	18.9	18.27 (b) (ii)	18.40 (d) (i) 18.40 (e) (ii) 18.40 (g) (v)		18.59 (a) (v) 18.59 (c) (ii)	18.76 (d) (ii) 18.76 (g)	18.84 (b)
Integration of water-quantity and -quality management	18.12 (k)	18.27 (b) (ii)	18.38 (b)	18.50 (a) (v)		18.76 (d) (iii) 18.76 (h) (v)	
Promotion of optimum allocation and efficient use of water	18.12 (d) 18.12 (e) 18.12 (l)		18.39 (a) 18.40 (b) (i)	18.50 (b) (vi) 18.50 (c) (viii) 18.50 (c) (xi)	18.59 (b) 18.59 (d) (i) 18.59 (f) (iii)	18.72 18.76 (a) (iii) 18.76 (b) (i)	

Table 7 (continued)

Broad group of proposed activities	Programme area						
	A	B	C	D	E	F	G
Improvement of drinking-water supply and sanitation			18.38 (b) 18.40 (b) (ii) 18.40 (c) (ii)	18.47 18.50 (a)	18.59 (a) (i) 18.59 (b) (ii) 18.59 (f)	18.76 (a) 18.76 (d) (v)	
Control of industrial discharges			18.40 (b) 18.40 (c)	18.50 (a) (v)	18.59 (a) (iv)		
Promotion of sustainable agriculture			18.40 (b) (vii) 18.40 (c) (iii) 18.40 (g) (iv)		18.59 (a) (vii)	18.76 (b) 18.76 (d) 18.76 (e)	
Protection of aquatic ecosystems		18.29	18.40 (b) (v) 18.40 (e) 18.40 (f)		18.56	18.76 (d) (iii) 18.76 (h) (iii)	
Control of water-borne diseases			18.38 (b) 18.39 (e)	18.50 (a) (vi)		18.76 (a) (vii) 18.76 (a) (ix) 18.76 (g) (iii)	
Promotion of environmental impact assessments	18.12 (c) 18.12 (f)	18.25 (a)	18.40 (b) (v) 18.40 (g) (ii) 18.40 (h) (iv)			18.72 18.76 (i) (iii)	18.85 (d)
Drought prevention and management	18.12 (f) 18.12 (h)	18.27 (a) (ii) 18.27 (b) (i) 18.27 (c) (iii)				18.76 (c) (iv) 18.76 (f) (i) 18.76 (f) (iii)	18.84 (c) 18.85 (c)
Flood prevention and management	18.12 (f)	18.27 (a) (ii) 18.27 (b) (i) 18.27 (c) (iii)			18.59 (a) (iii)	18.76 (c) (i) 18.76 (c) (ii) 18.76 (d) (iv)	18.84 (c) 18.85 (c) 18.88
Control of saline intrusion			18.40 (d) (ii)		18.56	18.76 (c)	18.82 18.85 (e)
Environmentally sustainable hydropower	18.18					18.76 (e) (vi)	
Enhancement of private sector involvement	18.18					18.81 (e)	
Promotion of public participation in water management	18.9 (c) 18.12 (n) 18.19	18.34 (d)		18.50 (b) (iii) 18.50 (c) (ii) 18.54	18.59 (c) (iii) 18.59 (f) (iv) 18.62	18.68 (d) 18.72	
Human resources development	18.19 18.20	18.31 18.32 18.33	18.38 (c) 18.45 18.46	18.50 (b) (iv) 18.53	18.59 (f) (iv) 18.62	18.79 18.80 18.81 (e)	18.89

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Table 7 (continued)

Broad group of proposed activities	Programme area						
	A	B	C	D	E	F	G
Strengthening of institutional and legal mechanisms	18.12 (o)(ii) 18.21 18.22	18.25 (d) 18.27 (a)(ii) 18.34 (a)	18.40 (a)(i) 18.40 (a)(v) 18.47	18.55	18.59 (c) 18.59 (e)(i) 18.63	18.76 (a)(vi) 18.81	18.90
Monitoring and assessment of implementation	18.22		18.40 (g) 18.40 (h)(i) 18.44	18.50 (d)(i) 18.50 (d)(ii)		18.76 (a)(v) 18.76 (b)(iii) 18.76 (d)(i)	
Strengthening of local water resources management	18.12 (m) 18.12 (o)(i) 18.22	18.34 (d)		18.50 (b) 18.50 (c) 18.54	18.59 (c) 18.59 (f)(i) 18.59 (f)(v)	18.76 (a)(iv) 18.76 (b)(iv) 18.76 (e)	
Strengthening of national water resources management	18.12 (a) 18.12 (o)(ii) 18.22	18.25 (b) 18.27 (a)(i) 18.27 (a)(iii)	18.40 (a)(iii) 18.42 18.43	18.50 (b)(i) 18.50 (c)(iii) 18.50 (c)(iv)	18.59 (e)(ii) 18.64	18.76 (a)(i) 18.76 (a)(vi) 18.76 (h)(i)	18.90
Strengthening of water basin resources management	18.9 18.10 18.12 (o)(iii)	18.27 (a)(iv)	18.36 18.40 (h)(i) 18.40 (h)(iii)				
Global coordination and international cooperation	18.12 (i) 18.12 (o)(iv) 18.22	18.29	18.39 (d) 18.42 18.43	18.50 (b)(vi) 18.50 (d)(iii) 18.55	18.61 18.64		18.85 (g) 18.87 18.88

Table 8. Proposed water-related activities set forth in other chapters of Agenda 21
(Relevant paragraph)

Broad group of proposed activities	Chapter 6	Chapter 7	Chapter 12	Chapter 13	Chapter 17	Chapter 21	Chapter 40
Promotion of inventory of water resources			12.12 (a)	13.5 (a)			40.8
Protection of potential sources of water-supply							
Development of new sources of water-supply							
Promotion of research and development	6.41 (c)(i)	7.39		13.10 13.21 (b)		21.35 (b)	40.8
Application and transfer of technology		7.39	12.12 (c)	13.21 (b) 13.21 (c)			40.8
Strengthening of information management			12.6 12.7 12.9				40.8 40.13
Data dissemination and public information	6.16 6.34 (a)(iii)	7.45 (a)	12.14 (b)	13.18 (b) 13.22 (a)		21.42 (a)	40.8 40.13
Integration of surface- and groundwater management							
Integration of land and water uses				13.14 13.15 (a)	17.6 (a)		
Integration of water-quantity and -quality management	6.33						
Promotion of optimum allocation and efficient use of water		7.16 (c)(i)					
Improvement of drinking-water supply and sanitation	6.5 (a)(i) 6.33 6.41 (c)(ii)	7.5 (d) 7.39 7.40			17.6 (f) 17.27 17.28 (j)	21.42 21.45 (c) 21.46	
Control of industrial discharges	6.41 (c)(ii)				17.28	21.35 21.39 21.40 (b)	
Promotion of sustainable agriculture	6.41 (d)				17.28 (h) 17.28 (i) 17.28 (j)		
Protection of aquatic ecosystems							

Table 8 (continued)

Broad group of proposed activities	Chapter 6	Chapter 7	Chapter 12	Chapter 13	Chapter 17	Chapter 21	Chapter 40
Control of water-borne diseases	6.10 6.12 6.13 (d)	7.35				21.29 (b) 21.39	
Promotion of environmental impact assessments	6.34 (c)(i) 6.40 (d)	7.41 (b)	12.12 (b)				
Drought prevention and management			12.46 12.47 12.48				
Flood prevention and management				13.7 (c) 13.18 (b)			
Control of saline intrusion					17.6 (e) 17.100 (c)		
Environmentally sustainable hydropower				13.24			
Enhancement of private sector involvement		7.45 (c)		13.18 (c) 13.24			
Promotion of public participation in water management		7.45 (c)	12.14 (b) 12.56 12.57	13.14 13.21 (b)			
Human resources development	6.16	7.45 (b)	12.13	13.22 (a)		21.25 (b)	
Strengthening of institutional and legal mechanisms	6.41 (c)(ii)	7.45 (d)	12.14 (a) 12.36 12.37				
Monitoring and assessment of implementation		7.39	12.9 12.10 12.12 (b)	13.7 (a)		21.11	40.8 40.13
Strengthening of local water resources management		7.45 (c)	12.10 (c)			21.29 (b)	
Strengthening of national water resources management							40.8
Strengthening of water basin resources management			12.10 (a) 12.10 (b)	13.18 (b)			
Global coordination and international cooperation			12.10 (a) 12.10 (b)			21.42 (a)	40.8 40.13

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12. The proposed activities put forward in programme area C (Protection of water resources, water quality and aquatic ecosystems) of chapter 18 of Agenda 21 can be classified within the following broad groups: (a) promotion of inventories of freshwater resources, (b) protection of potential sources of freshwater supply, (c) development of new sources of water-supply, (d) promotion of research and development, (e) promotion of application and transfer of technology, (f) strengthening of the role of modern information management, (g) integration of surface and underground water management, (h) integration of land and water uses, (i) integration of water quantity and quality management, (j) promotion of optimum allocation and efficient use of water, (k) expansion of drinking-water supply and sanitation, (l) control of industrial discharges, (m) promotion of sustainable agriculture, (n) protection of aquatic ecosystems, (o) control of water-borne diseases, (p) promotion of environmental impact assessments, (q) strengthening of drought prevention and management, (r) strengthening of flood prevention and management, (s) control of saline intrusion, (t) human resources development, (u) strengthening of institutional and legal mechanisms, (v) promotion of monitoring, evaluation and assessment of progress in implementation, (w) strengthening of national water resources management, (x) strengthening of water resources management at the basin (national or international) level, and (y) promotion of global coordination and international cooperation.

13. The proposed activities put forward in programme area D (Drinking-water supply and sanitation) of chapter 18 of Agenda 21 can be classified within the following broad groups: (a) protection of potential sources of freshwater supply, (b) development of new sources of water-supply, (c) promotion of research and development, (d) strengthening of the role of modern information management, (e) promotion of data dissemination and public information, (f) integration of water quantity and quality management, (g) promotion of optimum allocation and efficient use of water, (h) expansion of drinking-water supply and sanitation, (i) control of industrial discharges, (j) control of water-borne diseases, (k) promotion of public participation in development and management, (l) human resources development, (m) strengthening of institutional and legal mechanisms, (n) promotion of monitoring, evaluation and assessment of progress in implementation, (o) strengthening of local water resources management, (p) strengthening of national water resources management, and (q) promotion of global coordination and international cooperation.

14. The proposed activities put forward in programme area E (Water and sustainable urban development) of chapter 18 of Agenda 21 can be classified within the following broad groups: (a) protection of potential sources of freshwater supply, (b) development of new sources of water-supply, (c) promotion of research and development, (d) promotion of application and transfer of technology, (e) promotion of data dissemination and public information, (f) integration of land and water uses, (g) promotion of optimum allocation and efficient use of water, (h) expansion of drinking-water supply and sanitation, (i) control of industrial discharges, (j) promotion of sustainable agriculture, (k) protection of aquatic ecosystems, (l) promotion of environmental impact assessments, (m) strengthening of flood prevention and management, (n) control of saline intrusion, (o) promotion of public participation in development and management, (p) human resources development, (q) strengthening of institutional

and legal mechanisms, (r) strengthening of local water resources management, (s) strengthening of national water resources management, and (t) promotion of global coordination and international cooperation.

15. The proposed activities put forward in programme area F (Water for sustainable food production and rural development) of chapter 18 of Agenda 21 can be classified within the following broad groups: (a) promotion of inventories of freshwater resources, (b) protection of potential sources of freshwater supply, (c) promotion of research and development, (d) promotion of application and transfer of technology, (e) strengthening of the role of modern information management, (f) promotion of data dissemination and public information, (g) integration of surface and underground water management, (h) integration of land and water uses, (i) integration of water quantity and quality management, (j) promotion of optimum allocation and efficient use of water, (k) expansion of drinking-water supply and sanitation, (l) promotion of sustainable agriculture, (m) protection of aquatic ecosystems, (n) control of water-borne diseases, (o) promotion of environmental impact assessments, (p) strengthening of drought prevention and management, (q) strengthening of flood prevention and management, (r) control of saline intrusion, (s) promotion of environmentally and socially benign hydropower, (t) promotion of private sector involvement, (u) promotion of public participation in development and management, (v) human resources development, (w) strengthening of institutional and legal mechanisms, (x) promotion of monitoring, evaluation and assessment of progress in implementation, (y) strengthening of local water resources management, and (z) strengthening of national water resources management.

16. The proposed activities put forward in programme area G (Impact of climate change on water resources) of chapter 18 of Agenda 21 can be classified within the following broad groups: (a) protection of potential sources of freshwater supply, (b) promotion of research and development, (c) integration of surface and underground water management, (d) integration of land and water uses, (e) promotion of environmental impact assessments, (f) strengthening of drought prevention and management, (g) strengthening of flood prevention and management, (h) control of saline intrusion, (i) human resources development, (j) strengthening of institutional and legal mechanisms, (k) strengthening of national water resources management, and (l) promotion of global coordination and international cooperation.

C. Targets and financing

17. The United Nations Conference on Environment and Development secretariat has estimated the average total annual cost (1993-2000) of implementing all the activities listed in chapter 18 of Agenda 21 to be about US$ 54,770 million, of which US$ 17,040 million is expected to be provided by the international community on grant or concessional terms. A breakdown of this estimated total annual expenditure, according to the seven programme areas presented in chapter 18, is provided in table 9.

Table 9. Programme area targets and financing and cost evaluation of programme activities as set forth in chapter 18 of Agenda 21

Programme area	Programme area target by the year 2000	Financial target for the period 1993-2000
Integrated water resources development and management	"To have designed and initiated costed and targeted national action programmes, and to have put in place appropriate institutional structures and legal instruments; to have established efficient water-use programmes to attain sustainable resource utilization patterns" (para. 18.11 (a))	"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $115 million from the international community on grant or concessional terms" (para. 18.13)
Water resources assessment	"To have studied in detail the feasibility of installing water resources assessment services" (para. 18.26 (a))	"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $355 million, including about $145 million from the international community on grant or concessional terms" (para. 18.28)
Protection of water resources, water quality and aquatic ecosystems	"To reduce the prevalence of water-associated diseases, starting with the eradication of dracunculiasis (guinea worm disease) and onchocerciasis (river blindness)" (para. 18.39 (e))	"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $1 billion, including about $340 million from the international community on grant or concessional terms" (para. 18.41)
Drinking-water supply and sanitation	"At the World Summit for Children, in September 1990, heads of State or Government called for both universal access to water-supply and sanitation and the eradication of guinea worm disease by 1995. Even for the more realistic target of achieving full coverage in water-supply by 2025, it is estimated that annual investments must reach double the current levels" (para. 18.49)	"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $20 billion, including about $7.4 billion from the international community on grant or concessional terms" (para. 18.51)
Water and sustainable urban development	"To have ensured that all urban residents have access to at least 40 litres per capita per day of safe water and that 75 per cent of the urban population are provided with on-site or community facilities for sanitation; to have established and applied quantitative and qualitative discharge standards for municipal and industrial effluents; to have ensured that 75 per cent of solid waste generated in urban areas are collected and recycled or disposed of in an environmentally safe way" (para. 18.58 (a), (b) and (c))	"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $20 billion, including about $4.5 billion from the international community on grant or concessional terms" (para. 18.60)
Water for sustainable food production and rural development	"FAO global projections for irrigation, drainage and small-scale water programmes for 130 developing countries are as follows: (a) 15.2 million hectares of new irrigation development; (b) 12 million hectares of improvement/modernization of existing schemes; (c) 7 million hectares installed with drainage and water control facilities; and (d) 10 million hectares of small-scale water programmes and conservation" (para. 18.71)	"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $13.2 billion, including about $4.5 billion from the international community on grant or concessional terms" (para. 18.77)
Impacts of climate change on water resources	None	"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $100 million, including about $40 million from the international community on grant or concessional terms" (para. 18.86)

18. Under programme area A (Integrated water resources development and management), the main targets by the year 2000 are: (a) to have designed and initiated costed and targeted national action programmes, (b) to have put in place appropriate institutional structures and legal instruments, and (c) to have established efficient water-use programmes to attain sustainable resource utilization patterns (para. 18.11 (a)).

19. Under programme area B (Water resources assessment), the main target by the year 2000 is to have studied in detail the feasibility of installing water resources assessment services (para. 18.26 (a)). As table 7 indicates, no specific targets are provided for complementary programme area G (Impacts of climate change on water resources).

20. Under programme area C (Protection of water resources, water quality and aquatic ecosystems), the main target by the year 2000 is to reduce the prevalence of water-associated diseases, starting with the eradication of dracunculiasis (guinea worm disease) and onchocerciasis (river blindness) (para. 18.39 (e)).

21. Although heads of State or Government, at the World Summit for Children, held in September 1990, called for both universal access to water-supply and to sanitation and eradication of guinea worm disease by 1995, according to what is stated under programme area D (Drinking-water supply and sanitation) of chapter 18 of Agenda 21, even for the more realistic target of achieving full coverage in water-supply by 2025, it is estimated that annual investments must reach double the current levels (para. 18.49).

22. Under programme area E (Water and sustainable urban development), the main targets by the year 2000 are (a) to have ensured that all urban residents have access to at least 40 litres per capita per day of safe water and that 75 per cent of the urban population are provided with on-site or community facilities for sanitation, (b) to have established and applied quantitative and qualitative discharge standards for municipal and industrial effluents, and (c) to have ensured that 75 per cent of solid waste generated in urban areas are collected and recycled or disposed of in an environmentally safe way (para. 18.58 (a), (b) and (c)).

23. According to what is stated under programme area F (Water for sustainable food production and rural development), Food and Agriculture Organization of the United Nations (FAO) global projections for irrigation, drainage and small-scale water programmes by the year 2000 for 130 developing countries are as follows: (a) 15.2 million hectares of new irrigation development, (b) 12 million hectares of improvement/modernization of existing schemes, (c) 7 million hectares installed with drainage and water control facilities, and (d) 10 million hectares of small-scale water programmes and conservation (para. 18.71).

Notes

1/ See Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I. Resolutions Adopted by the Conference (A/CONF.151/26/Rev.1).